

DECEMBER 21, 1914

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MOTOR AGE

NEW YORK SHOW ISSUE

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5 Passenger Touring Car \$695 2 Passenger Roadster - \$670
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Any Model equipped with Electric Self-Starter \$55 Extra.

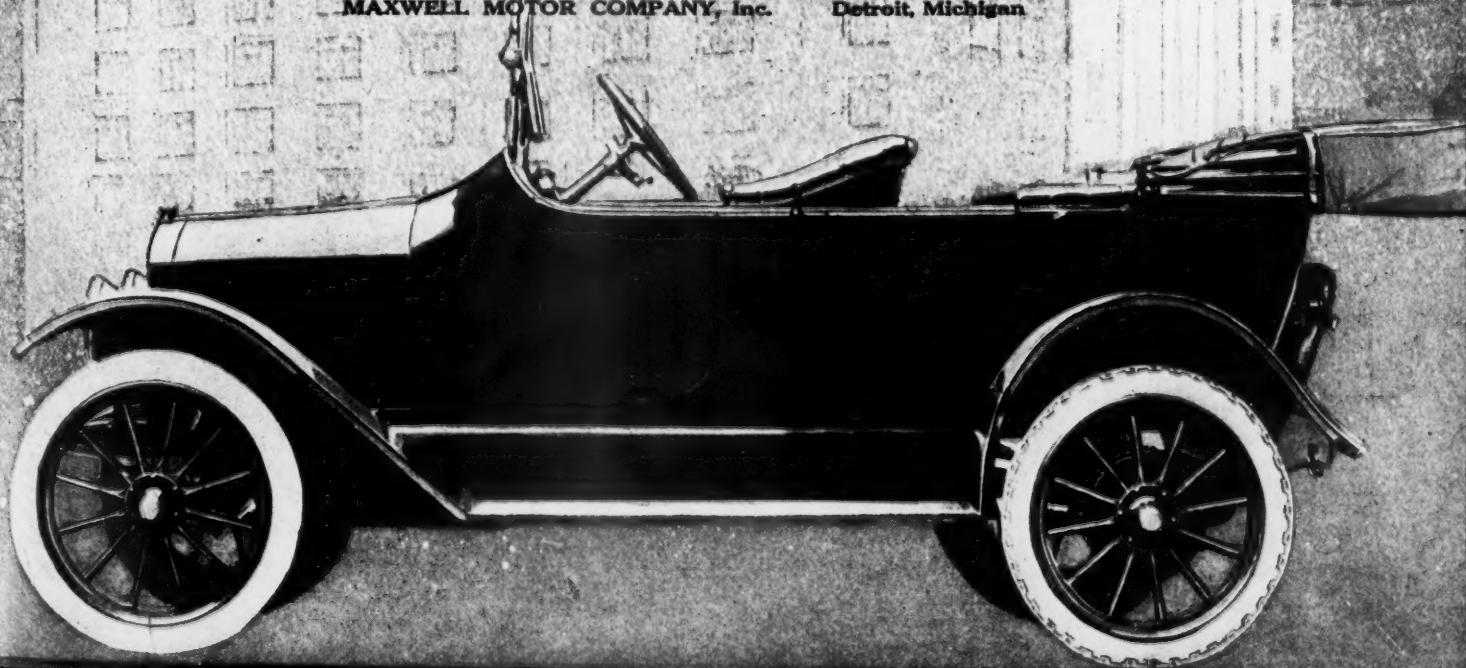
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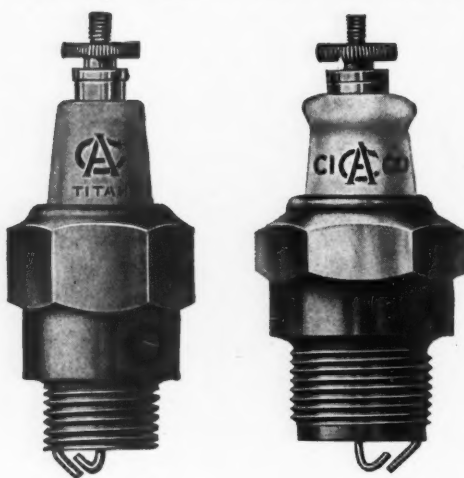
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MAXWELL MOTOR COMPANY, Inc. Detroit, Michigan





They Set the Pace



RECOGNITION

NAME OF CAR

Apperson
Buick
Cadillac
Chalmers
Chase
Chevrolet
Cole
Commerce
Cartercar
Dodge Bros.
Federal
Ferro
Flint
General Motors
Haynes
Harley-Davidson
Henderson
Hudson
Hupp
Jackson

A GLANCE at the names bordering this page will give a fair idea of the "clean-up" made with the 1915 AC line. A large majority of the good automobile manufacturers have adopted AC, Titan and Cico plugs because they are efficient and the result has been that nearly all other plug makers have felt the necessity of making a plug that looks somewhat like these types in order to be in the running.

A few of these experiments are already on the market.

Bear these facts in mind and insist on getting AC, Titan and Cico plugs. They have been endorsed by the Engineers of the leading automobile factories.

AC, TITAN, CICO are the only plugs we manufacture.

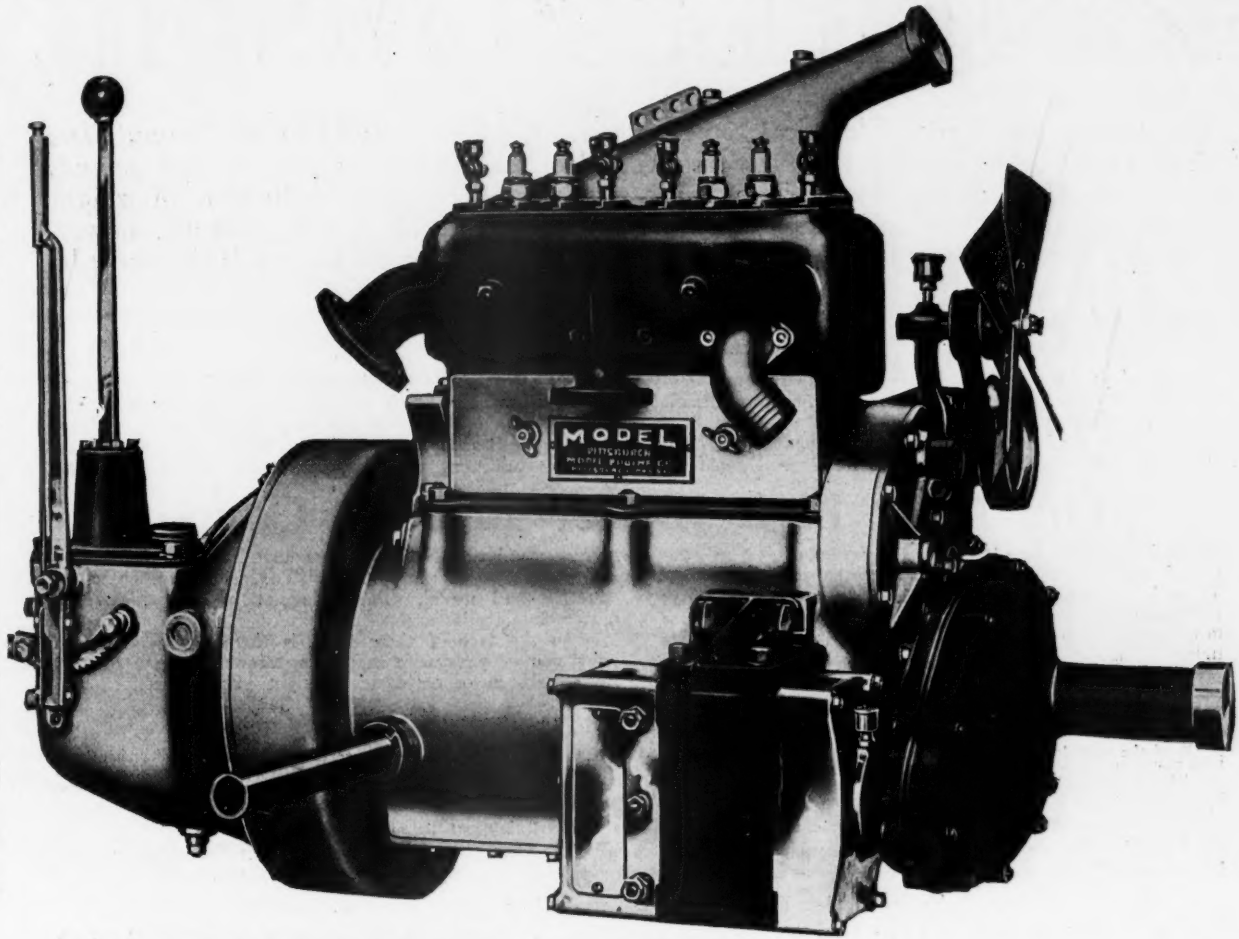
Do Not Be Misled

NAME OF CAR

Knox
Lambert
Lexington-Howard
Marathon
McLaughlin
Monroe
Moon
National
Oakland
Olds
Premier
Pullman
Reo
Saxon
Stearns
Touraine
Velie
Wilcox Truck
1915 AC Packard

CHAMPION IGNITION COMPANY FLINT, MICHIGAN

MODEL MOTORS



IF YOU WANT MOTORS OF QUALITY:—

That are produced by men of long experience in motor manufacture,
That are built in a new and modern factory where conditions are ideal,
That afford maximum Horse Power and Minimum Weight,
That are backed by a guarantee second to none,
That give the much sought after "Snap" to your Car,
That give you value received for every cent you invest,
That satisfy your most exacting customers,
Then, write at once for complete information.

Two new sizes, 2 3/4 x 4 1/2 "4" and 3 x 5 "6"

Pittsburgh Model Engine Co.,

Lexington St. & Pennsylvania R. R.—Pittsburgh, Pa.

Factories, Peru, Ind., and Pittsburgh, Pa.

1/2 Ton Less Weight

The New Light Baker Electric Coupe weighs 2913 lbs.—*a full thousand pounds less* than any of the big heavy five-passenger electrics, and *from 400 to 500 pounds less* than ANY enclosed electric of high grade make. Mere reduction in weight is no advantage in an electric if secured at a loss of speed, mileage, power, strength or comfort. The achievement of the Baker is in its light weight

PLUS

FULL SPEED
FULL MILEAGE
FULL POWER
FULL STRENGTH

The speed is 23 miles per hour—the highest ever built into an electric coupe. As for mileage, no electric made gives more per battery charge. In point of power, this light electric will negotiate any hill that *any* motor car can climb. And it will *stand up*

through years of hard service, for it has the same structural strength which has characterized the Baker chassis and body for over fifteen years. (Baker Electrics have always been light weight cars.) And in addition, with so much less weight to carry,

The New Light Baker Electric Coupe

is *much easier to handle* on rough pavements or in congested traffic—it steers and turns with the least effort. There is *less wear and tear* on the car; tires last longer; *upkeep expense is reduced*. In short, this electric becomes more than ever a source of pleasure, because of its lighter weight.

In style and beauty the New Light Baker has set

a new standard. Needless adornment has been supplanted by a rich, simple refinement. The color effects are attractive and novel. There is not a more luxurious automobile made.

In the face of these facts, is there any good reason why you or your wife should lug around from a quarter to a half-ton of extra dead weight in an electric?

The Baker Double Drive Brougham

is one of the most luxurious electrics of the larger type that has ever been built. It closely resembles the New Light Coupe in general design, the difference being in its larger proportions to accommodate five people instead of four, its double drive feature which enables operating from

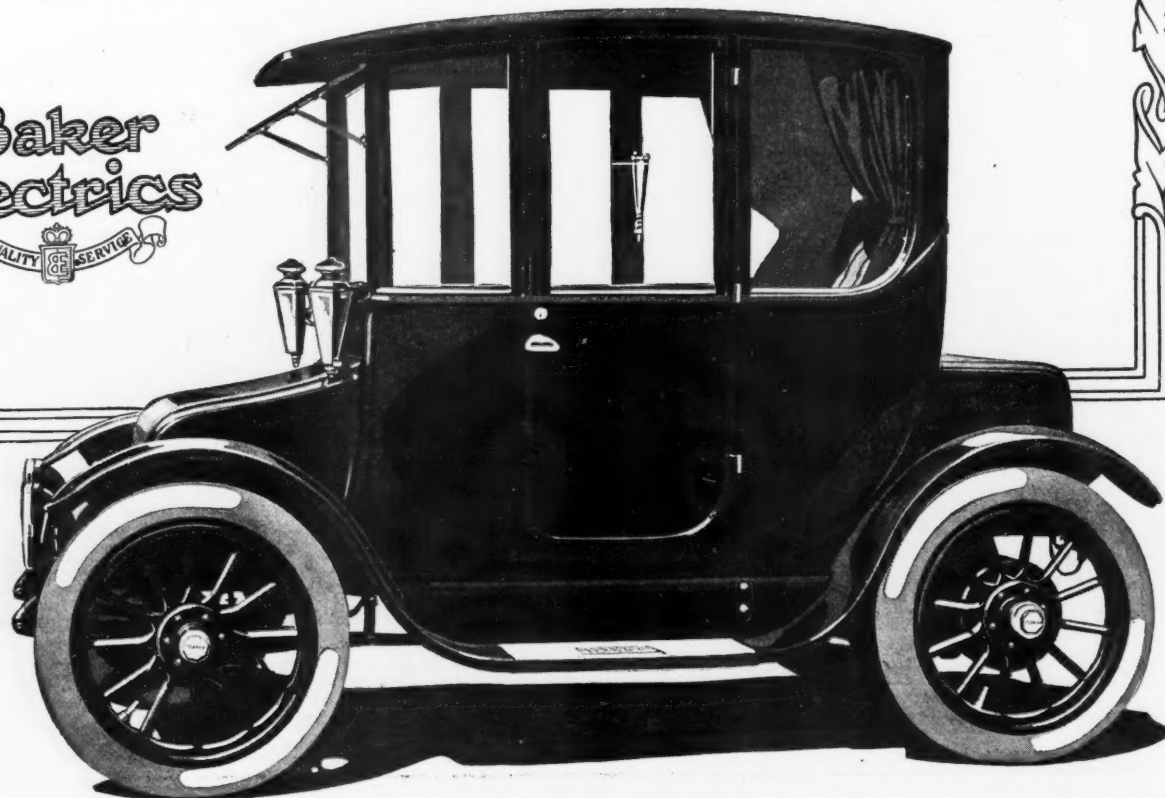
either front or rear seat, and its seating arrangement. For those who require a large five-passenger car this imposing brougham, equipped with every known motor car refinement, is an ideal model, *and for a car of its size it is lighter than any other electric made.*

Before you buy an electric, read page seven of the new Baker catalog, mailed on request.

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Also a complete line of commercial trucks from one to five tons.

THE BAKER MOTOR VEHICLE COMPANY, CLEVELAND



The New
Light
Baker
Electric
Coupe.

Price
\$2800.

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MOTOR AGE



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December 31, 1914

No. 27

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Next week's issue of Motor Age will contain a complete report of the fifteenth annual New York show, promoted by the National Automobile Chamber of Commerce.

SULZBERGER'S Sterilized CURLED HAIR

*Automobile Upholstery
De Luxe*

LUXURIOUSLY * RESTFUL *

In a heavy percentage of motor car sales the lady is the important deciding factor. Luxurious, restful upholstery is one of the little things that count big in her decision.

Other things equal, the sale goes to the car upholstered with

SULZBERGER'S STERILIZED CURLED HAIR

Automobile Upholstery De Luxe

Its rare resiliency insures ease and relaxation on any road—
Its durability assures prolonged wear—

Its slightly higher price is but practical economy. In the long run it costs less than cheap substitutes. A big selling point for your new model cars, is upholstery trimmed with SULZBERGER'S Sterilized Curled Hair.

WRITE FOR SAMPLES

SULZBERGER & SONS CO.

Chicago  Illinois



Perkins' Adjustable Condensing Driers

PATENTED

Just how adjustable, the following daily record of one week's drying of Green Gum Sticks shows:

Date.	Kiln Temperature.	Water Temperature.	Humidity.
October 2.....	108.....	70.....	43
October 3.....	108.....	70.....	41
October 4.....	108.....	72.....	40
October 5.....	106.....	72.....	39
October 6.....	106.....	72.....	42
October 7.....	106.....	70.....	40
October 8.....	110.....	70.....	39

This record shown is the fourth week in drying. Walnut stands a higher temperature and can be dried with less humidity than oak.

Many people do not understand that the drying of everything is only a question of giving it the temperature and humidity that it needs, and that, given this temperature and humidity, anything may be dried much better artificially than when subjected to outdoor conditions. When I came to Chicago with this drier I met with general unbelief that green oak could be better dried artificially than by the old air-drying method. I was frank to state that I did not then know the temperatures and humidities needed to dry different varieties and dimensions. I recall the engineer of the International Harvester Company, who was my first customer, stating, "While I think you have a room in which control may be obtained, we have never dried this oak green and would not know where to begin." I recall the oak staves stored in New Orleans from the Arkansas swamps and had noted that they did not check so gave him the New Orleans climate to start the drying.

Below is given the average weekly Winter temperatures and humidities used in drying 5 in. green oak:

Weeks.	Temperature.	Humidity.
1.....	76 degrees.....	73%
2.....	82 degrees.....	62%
3.....	82 degrees.....	70%
4.....	82 degrees.....	76%
5.....	86 degrees.....	78%
6.....	96 degrees.....	74%
7.....	98 degrees.....	73%
8.....	100 degrees.....	68%
9.....	102 degrees.....	69%
10.....	100 degrees.....	74%
11.....	108 degrees.....	71%
12.....	118 degrees.....	68%

Going from the other extreme of 12 weeks in drying 5 in. green oak as shown above, on a recent installation

drying well air-dried stock, I have dried 1 in. basswood in 2½ days and 1 in. oak in 5 days.

The manufacturers today freely express themselves as to the large saving I have made them in carrying stocks and stopping waste. The Forestry Department have given me credit on the same lines. This carrying stock in the yard means a loss of growth in the forest. The value of the kiln is also shown in drying wide-panel stock—this for its utility in doing things that no other drier has ever done. In addition to this, it is the most economical method of drying anything. When taking into consideration the fact that its cost is but little more than any drier properly built, the reason is seen why I have the endorsement of all engineers. After investigating my work at the J. G. Brill Company's plant, Philadelphia, Pa., the government gave me the order for their latest plant at Pearl Harbor, Hawaii. It is also used at the Rock Island Arsenal. The last record shown above is from the Moline Wagon Company at Moline, Illinois, to whom I sold 42 rooms. The drier is now in general use all over the World. I can give you reference anywhere, and can give you what no one could give when I began my work—an exact knowledge of all temperatures and humidities to use on any stock, and the engineering knowledge as to the construction of building, quantity and distribution of pipe to obtain an exact result.

With the understanding that all drying is merely a question of humidity and temperature, and the fact that nine out of every ten factories, outside of the metal trades, have a drying room, the reason can be readily seen why I have never been obliged to charge a positive royalty on my patents. The process is just as valuable for drying finish as for drying the wood, and has also received commendation from the large manufacturers of confectionery. The last order I received for the year, completing a very successful year's work, was an order for 3 rooms from the Biddle & Smart Company, Amesbury, Mass., for drying panel and frame stock in the manufacture of Auto bodies.

My material is all delivered from the mills at the nearest manufacturing point. This, with my knowledge of the business and careful attention to your wants, gives you a real value.

I am glad to mail you "A Talk On Drying," which gives additional information relative to this method, upon your request.

Monadnock Block

ELMER E. PERKINS CHICAGO, U. S. A.

MOTOR AGE

"Art is Long
Time is Fleeting"

MOTOR car building as an art is a process of slow development and refinement of detail, but each year shows some clear-cut gains. Opening of the annual motor car shows at New York has come to be the signal for turning all motoring eyes to the eastern metropolis for the first comprehensive view of what the new year is to bring forth. This year's exhibition will be of greater moment than any previous one, so far as motor car development is concerned, for there is little, if any, development among European makers now.

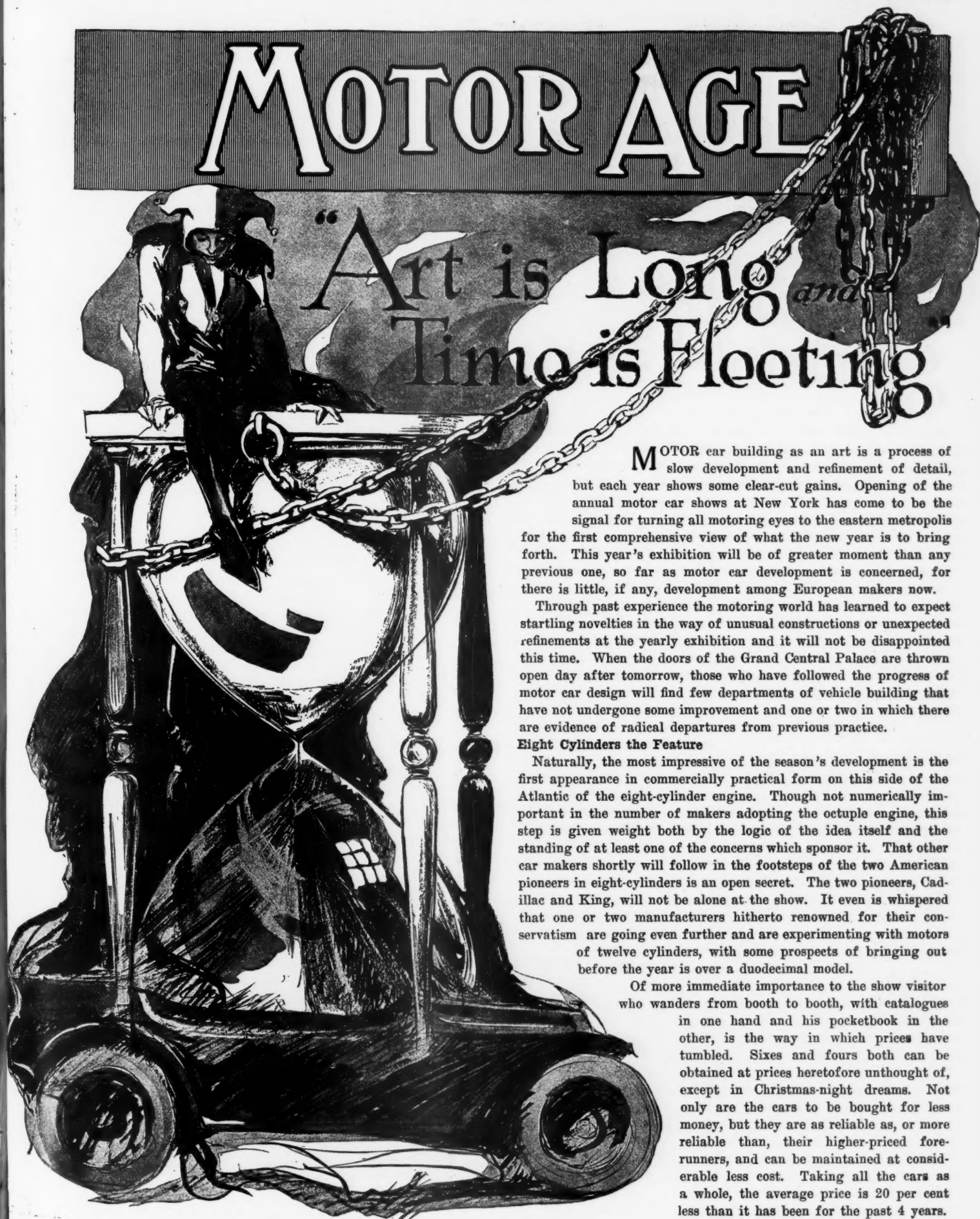
Through past experience the motoring world has learned to expect startling novelties in the way of unusual constructions or unexpected refinements at the yearly exhibition and it will not be disappointed this time. When the doors of the Grand Central Palace are thrown open day after tomorrow, those who have followed the progress of motor car design will find few departments of vehicle building that have not undergone some improvement and one or two in which there are evidence of radical departures from previous practice.

Eight Cylinders the Feature

Naturally, the most impressive of the season's development is the first appearance in commercially practical form on this side of the Atlantic of the eight-cylinder engine. Though not numerically important in the number of makers adopting the octuple engine, this step is given weight both by the logic of the idea itself and the standing of at least one of the concerns which sponsor it. That other car makers shortly will follow in the footsteps of the two American pioneers in eight-cylinders is an open secret. The two pioneers, Cadillac and King, will not be alone at the show. It even is whispered that one or two manufacturers hitherto renowned for their conservatism are going even further and are experimenting with motors of twelve cylinders, with some prospects of bringing out before the year is over a duodecimal model.

Of more immediate importance to the show visitor who wanders from booth to booth, with catalogues in one hand and his pocketbook in the other, is the way in which prices have tumbled. Sixes and fours both can be obtained at prices heretofore unthought of, except in Christmas-night dreams. Not only are the cars to be bought for less money, but they are as reliable as, or more reliable than, their higher-priced fore-runners, and can be maintained at considerable less cost. Taking all the cars as a whole, the average price is 20 per cent less than it has been for the past 4 years.

One thing that will assist the purchaser, or prospective purchaser, of a new car is





Right-side gearshift control has dwindled since 1912 and center control has grown in proportion

the fact that the field is considerably more limited than it has been for at least 5 years. Heretofore the possible buyer who studied a season's offerings with a view to the purchase of a car, was confronted with such an embarrassment of riches in designs and models that a choice was anything but easy. In 1911 he had nearly 400 different models to choose from, presented by 270 makers. This year there are only half as many models and less than half as many manufacturers to consider.

Fewer Models on Market

The field has narrowed considerably, even as compared with last year. There are 200 chassis models this season, instead of the 236 models of 1914 vintage. This reduction is due to two causes. One of these is the fact that manufacturers are not making quite so many different chassis models as they did. A number, it is true, have two models for the new season, who had only one for 1914, always due to the addition of a six to a line which formerly consisted of a single four.

But there are fewer makers offering three and four and five different models. For 1914, the average was 1.8 chassis per manufacturer. For 1915 this average has dropped to 1.66 chassis models for each maker. This reduction in the number of chassis models produced by a concern makes for greater efficiency in the factory and sales, thus lower cost to the purchaser.

A more potent reason for the lower number of models is the fact that there are fewer car makers in the field. This concentration of the industry began a year ago, when the number of makers dropped from 156 in 1913 to 133 for the 1914 season. For the 1915 season the reduction continues, the number of makers falling off to 119. Glancing over the army of American cars for the new season, we find that there has disappeared from the ranks a number whose names have been familiar to the buying public for years.

It cannot be taken for granted in every case that the mere fact that they do not answer to roll call at this time means that

they no longer will be manufactured. In some instances, it only means that the plans of the manufacturers have not been decided upon at this time to an extent which will permit them to be made public. In others, legal or financial difficulties have made it necessary to suspend temporarily any activities in a manufacturing way.

Nevertheless, in most cases, the listing

CARS WITH SPIRAL-BEVEL DRIVE

Cadillac	Kline, 6-42 & 6-42, A
Cole, four	Marmon, 41
Crawford, 6-35	Packard 3-38 & 5-48
Cunningham, 8	Peerless, 54, 55, 48
Dorris, 1-A-4	Rco, M
Franklin, 6-30	Singer, 6
Hudson, 6-40	Speedwell, 1
Jeffery, 6	Stearns, 6
	Winton, 24A

CARS WITH WORM DRIVE

Jeffery, Chesterfield
Lyons-Knight, K-4
Willys-Knight

of a car among the missing means that its maker has definitely abandoned the motor car industry, or at least the building of pleasure cars. Among the cars which at this time have not appeared upon the market for 1915 are the following:

Ames, Cameron, Colby, Continental, Correja, Croxton, Day Utility, DeSoto, Duryea, Fal, Flyer, Gleason, Henderson, Holly, Illinois, Knox, Lozier, Marathon, Metropo, Mondex-Magic, Moyer, Ohio, Palmer-Singer, Pope-Hartford, Read, Richmond, Selden, S. & M., Spoerer, Staver, Tribune, and Vaughan.

Many new nameplates will be noticed on the cars lined up for inspection, for there have been an even score of new cars added to the industry during the past 12 months. The newcomers include:

Argo, the lowest-priced car on the market; Briscoe, which made its debut at the Palace last year; Cycleplane, a little one at a low price; Dile, a little four; Dodge, one of the latest; F. R. P., product of racing; Herff-Brooks, a hyphenated Hoosier; Kearns, another little four; Owen, with electric transmission; Peter Pan, a little four; Remington, a little four with automatic gearshift; Scripps-Booth, a little four; Singer, a new six from the factory of the former Palmer-Singer; Sphinx, Monroe, Trumbull, Twombly and Vixen, all little fours of low price. Some of these were with us as cyclecars a year ago.

In addition, another name, once familiar, but last year submerged by financial difficulties, appears. This is the R. C. H., now produced by an entirely new concern.

Small Four Development

Of the new cars, nearly all illustrate the rapid rise in popularity of the small four—small in engine size, in running cost and in first cost. Of the new fours, all but one are 3½ inches or less in bore and most of them are under 3 inches cylinder diameter. The majority of them are designed to sell at something under \$800 with complete equipment.

Only two of the cars make their initial appearance as six-cylinder models, the Owen and the Singer, new makers seemingly devoting their efforts almost exclusively to the low-priced four. The older manufacturers, however, have more than made up for any neglect of the six by the new makers. The majority of the new models announced by the older makers are sixes and nearly all are light sixes. Ten manufacturers announce a six for the first time, eight of these being makers who formerly have devoted themselves to the four and the other two being new makers.

Entrance of the six into the \$1,000 class as exemplified particularly by the new Grant and Saxon little sixes at less than \$800 is bound to have an appreciable effect on car prices, both sixes and fours, and it is not unreasonable to expect that there will be others before the season is out.

This season marks the demise, temporarily at least, of the cyclecar, a move-



Relative popularity of the three locations for the fuel tank for 1914 and 1915

ment which showed so much promise 12 months ago. It is doubtful if any one development in motordom ever has had such a sky-rocket career as the past year witnessed in the cyclecar. As an idea, it caught the fancy of designers, investors and public, but less than 6 months served to show that it is at the moment impossible to produce a vehicle of this design which will fulfill at the same time the three requirements of low first cost, reliability and an adequate profit to the manufacturer.

So the cyclecar grew into a standard-tread four-cylinder water-cooled shaft-drive vehicle at an increased price and turned out to be a light low-priced motor car with little of the unconventional about it except the size and price. A number of the little fours on the 1915 market are produced by concerns which in 1914 were working on cyclecars.

Also, some of the wise ones among the makers saw the trend and brought out little fours without going through the transition period of cyclecar experimentation, at least, publicly. Other little fours are simply new and smaller models of former larger fours.

Along with the decrease in cost and size of the cars of 1915, there has been a general addition to the stock equipment and a general improvement of the equipment previously furnished. Electric lighting and cranking is practically universal on all but the very cheapest of the new cars. The one-man type of top which made its appearance in a few cars the first of the year, is almost a matter of course, as are the quick-operating types of side curtains. Power tire pumps, demountable rims, trouble lights, etc., are general. Headlight dimmers of one type or another, have become almost universal as stock equipment, since the enforcement of local ordinances in most cities against glaring headlights.

Much Improvement in Bodies

Externally, there has been exceptional improvement in the cars, both from the point of appearance and comfort. Stream lines, a trend which has gained in favor for the past 2 years, have become universal. The sloping hood, the smooth lines at its juncture with the dash, smooth body sides, crowned fenders and clean running boards are so general that comment is useless. This is carried even farther in

RIGHT-HAND DRIVE

1912-90%



1915-14%

LEFT-HAND DRIVE

1915-86%

1912-10%



The driver has made a decided shift of location during the past 3 years. Right and left drive compared for 1912 and 1915

the Chalmers and Regal, in which the radiator filler caps have been hidden beneath the hood so that there will be no break in the lines of the car. Makers who formerly arranged the gasoline fillers for

White and Austin, in which a sort of double cowl is fitted, one at the dash and one at the rear of the front seats.

Seating arrangements have undergone considerable change, in the introduction of individual seats, either in front or in both front and rear. This was introduced by the Kisselkar early in the year and has been adopted in modified or amplified form by National, Pathfinder, Peerless, Cole, Velie and others.

Convertible Bodies

Convertible bodies, which made their appearance last winter, are shown in larger numbers this season. At least fifteen different makes of cars can be obtained with the folding tops which permit their transformation from a roadster to a coupe or vice versa. Others have removable sedan or coupe tops. Removable tops for touring cars which convert them into comfortable and natty sedans for winter work are the latest development in this line. Such tops are offered on Pathfinder, Kissell and Hupmobile, while Overland makes a special offer of two bodies for a single chassis.

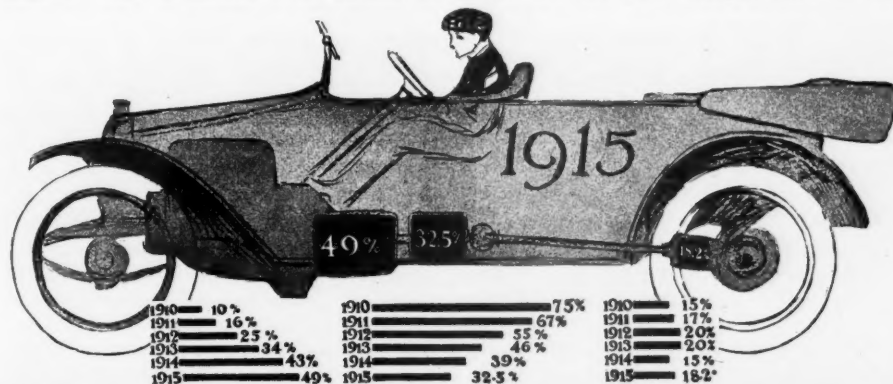
In connection with the single-compartment bodies mentioned above may be detailed a new body arrangement which has come into being since the beginning of the 1914 season. This is the two-door body for touring cars and sedans, which is made possible by the single compartment arrangement, and which in turn is a result of the use of bifurcated front seats. Inasmuch as unhindered access is given to the front seats from the tonneau, it has been found possible to do away with the doors in the forward compartments, so that the fore doors of the four doors are done away with. Kissel car at the present moment is the only exponent of the two-door body for touring cars, and this feature has been extended to include sedan bodies, particularly the demountable sedan. Pathfinder,

CARS WITH COWL FUEL TANK

Alter, 4-27	Case, 25
Argo	Chalmers Light Six
Cycleplane, Tourist	Dile
Detroitler, C	Glide, 30
Empire, 31-40	Herreshoff, 4-16
Enger, 6-50	Hupmobile, 48-6
Grant, M & T	Jackson, 48-6
Hudson, 6-40, 6-54	King
Imperial, 64	Krit, M-O
Inter-State, T	Lambert, 68, 48
Pathfinder	Lyons-Knight, K 4
Partin Palmer, 20	Maxwell, 25
Stearns, Light Four	Monarch, 6
Trumbull, 15-A	Rayfield, 20
Arbenz	Saxon
Briscoe	Sphinx, A 15

dash tanks in front of the windshield have placed the filler pipe on the cowl board where it will not interfere with the lines and where the tank can be filled from the service station without requiring that the driver leave his seat.

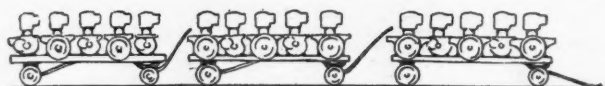
Latest of the developments in body design is the boat body as exemplified in the National, Cole, Oakland, King, and others. Another and a similar development are the new designs used in the



Gearset locations compared for 6 years expressed in percentage of chassis with each location



L-HEAD MOTORS
1915 70%



L-HEAD MOTORS
1914 59%



T-HEAD MOTORS
1915 16%



T-HEAD MOTORS
1914 30%

L-head motors are being turned out in greater numbers than ever. Popularity of L-head and T-head designs compared for 2 years

CARS WITH CANTILEVER SPRINGS

Austin, 66	Pilot, 55
Bulck, C-54, C-55	Pullman, Jr.
Case, 25	Reo, six
Chalmers, New Six	Scripps-Booth
Grant, 6	Singer, 6
Jeffery-Chesterfield	Sphinx, A 15
King	Stearns Light Four
Lexington, 6-L	Trumbull, 15 A
McIntyre, 25	Vulcan, 35
National, AA	Westcott, U
Paige, six	Willis-Knight
Pathfinder	

CARS WITH WIRE WHEELS

Argo	Pullman, 6-48
Willis-Knight,	Rayfield
K-19	Saxon, A
Dile, A	Scripps-Booth, C
F. R. P.	Trumbull, 15 A
Grant, M	Twombly
Herreshoff	Vixen, S-B
Metz, Touring	Cycleplane

Kissel and Velie also have two-door sedans.

Location of the driver has undergone a slight change, most of the few makers which arranged for right drive in 1914 have shifted to the left side for the 1915 season. Among those who have made this change are such firms as Overland, Hupmobile and McIntyre. Jackson, which had left drive and left control, has shifted the control levers to the center. Krit has changed the control levers from the center to the left side.

More Cowl Fuel Tanks

Another feature which has gained in popularity is the use of the cowl gasoline tank. Of the 1915 cars 27 per cent have the fuel tank in the cowl. This is double the proportion of those so equipped for 1914, only 13 per cent of the 1914 cars having the fuel tank in front of the dash. The tank location under the front seat has suffered a severe decline within the past 12 months, dropping from 46 per cent in 1914 to 21 per cent for 1915.

This cutting in half of the under-the-front-seat location of the tank is due to two causes, one of them the increased popularity of the cowl tank, the other reason is the appearance and almost unprecedented growth in popularity within the past 6 months of a new method of fuel supply. This is known as the Stewart vacuum feed and combines the advantageous location of the fuel tank which is a feature of the pressure feed with the more constant and less sensitive character-

istics of the gravity system. Less than a year old, the vacuum feed system now claims over 20 per cent of the field.

One of the features in which there has been shown an unusual advance is the ignition system. Single ignition, that is, the type in which there is only one source of current supply for the spark, had been steadily declining for many years and the double ignition had been showing a corresponding increase in popularity with the coming of the electric starter, the single ignition took a jump in popularity to 23 per cent and this season the percentage has increased to more than double, being 56 per cent of the total number of chassis.

This can be accounted for in two ways, one of them is the development of magnetos to the point where manufacturers felt perfectly safe in trusting the ignition to this source of current alone. The other

NEW MAKES OF CARS FOR 1915

Argo	Monroe
Cycleplane	Owen
Dile, A	Peter Pan
Dodge	Remington
F. R. P., 45-8	Singer, 6
Kearns	Sphinx, A-15

NEW MAKES OF SIXES FOR 1915

Enger, Six-50	Paige-Detroit, 6
Grant	Reo, M
Monarch, 6	Saxon, B
Overland, 82	Singer, 6
Owen	

reason is the introduction of the automatic advance feature to the combination timer-distributors of the battery ignition system, thus giving the battery ignition system a feature in which it was chiefly lacking, and which had been an argument in favor of magneto ignition. With the constant supply of current present in the cranking and lighting battery, makers decided it unnecessary to incur the additional expense of a magneto.

Reduction of weight in cars as a whole has been quite general throughout the industry, although, in one or two instances, there has been an increase of weight due either to added equipment or more commodious bodies. The general weight reduction has been obtained by the use of

smaller engines, a more universal use of light steel alloys, and in some instances by the use of tubular instead of solid shafts. The new Oakland and the new Peerless, for instance, employ tubular propeller shafts and the Scripps-Booth use tubular shafting in its transmission system. All Spicer universals this year have tubular shafts between them.

Spiral-bevel gears as a means for the final drive reduction at the rear axle has shown an increase of from 1 per cent for the past year to 10 per cent in the 1915 cars. This type of gear is not so expensive as the worm, but has the worm's advantage of quiet, smooth and efficient power transmission without its difficulties of lubrication and installation. Worm drive has not shown more than a slight increase in popularity. There was 1 per cent of the chassis fitted with the worm in 1914 models and there is 1.5 per cent in the 1915 cars.

What may be considered in some quarters a step backwards, is the falling off in popularity, so far as percentages go, of the floating type of axles, and the corresponding gain on the part of the semi-floating and three-quarter floating types. The floating axle dropped from 65 to 56 per cent during the past season, the semi-floating gained from 17 per cent in the 1914 models to 23 per cent in the 1915 cars. The three-quarter floating type likewise exhibits a corresponding increase to 18 per cent as against 14 per cent in 1914.

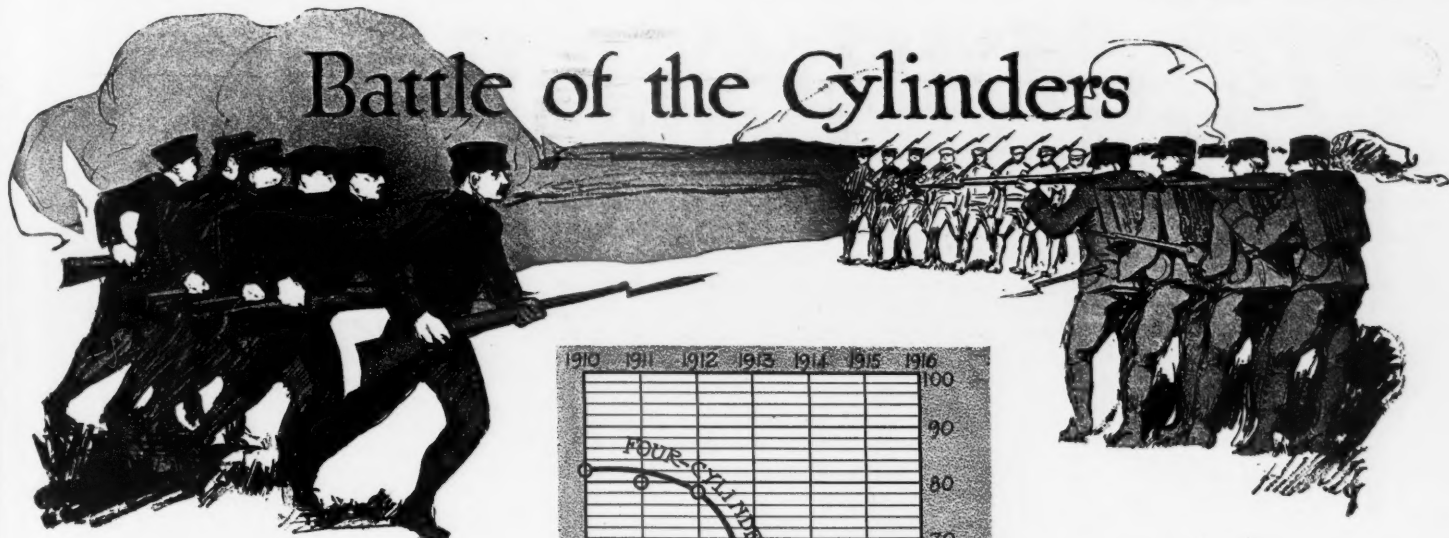
Spring Designs

Cantilever rear suspension has experienced a rather extensive broadening of its field. There are twenty 1915 cars using this type of spring as against ten for the 1914 season.

Along with the straight type of spring, such as a cantilever, there has been a growth in the employment of what is known as the Hotchkiss drive. This is a system in which the reaction of the forces which turn the rear wheels are taken directly through the springs and the rear wheels propel the car by pushing the frame through the spring instead of torsion radius rods and torque arms and torsion tubes. Among the concerns using the Hotchkiss drive are Hudson, National, Moon, Oakland and Velie, the three latter using this drive for the first time in the new cars.

Summing up the cars for 1915, the trends evidenced are toward smaller, lighter and cheaper vehicles, smaller bores and strokes, more complete equipment, more convenient operation and more attention to the comfort of driver and passengers. There are myriads of little things which show the effort toward easy maintenance. Such things as larger and more accessible grease cups, more easily-operated hood latches, handier arrangements of dash controls, and numerous instances, which, taken in the aggregate, show considerable development, but which generally are so inconspicuous on individual cars that they are quite likely to be overlooked.

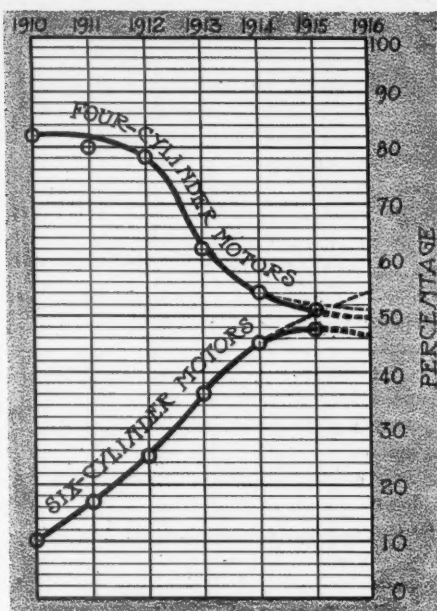
Battle of the Cylinders



IN the war of the cylinders, which has been going on for the past 6 years, and in which the sixes have been showing a very rapid, and withal, a steady advance, and the fours, a correspondingly rapid and constant retreat, there has come a sudden halt in the six's onward march, while the four seemingly has slackened a little in its backward course. Whether or not this is due to the entering of a new ally into the field in the form of the eight is a matter of question. Nevertheless, it is a subject of note that there has been a decided check in the rate at which the sixes have inroached on the territory of the fours.

Sixes vs. Fours

The real significance of all this war-time phraseology may be understood by a glance at the diagram on these pages showing the comparative popularity of the six and the four with the makers as expressed in the average number of chassis fitted with each type since 1910. The six-cylinder motor became a factor worthy of note in the industry, so far as any effect on the fours was concerned, not much before 1908, and even in 1910 it claimed but 10 per cent of the field, as shown in the curve referred to. From this time its popularity increased so that the 1911 models were 17 per cent sixes, the 1912 models 25 per cent and the 1913 cars showed 36 per cent sixes. Nineteen hundred fourteen models took an even greater jump in six popularity to 45 per cent, almost half the field.



Graphic illustration of the progress of the fight between sixes and fours since 1910 and a prophecy for 1916. The light dotted line shows Motor Age's prophecy last year

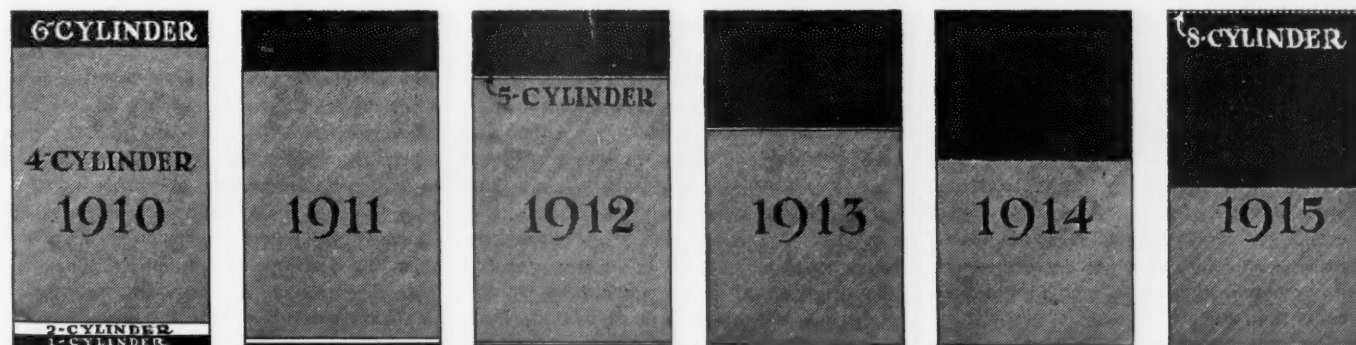
The four-cylinder status fell off correspondingly during these years from 82 per cent in 1910 to 54 per cent in the 1914 cars. Judging from past performances, then, it was to be expected that the percentage curves would continue in the directions they have been taking in the past 5 years and that the 1915 models would be almost equally divided between fours and sixes, as indicated by the dotted lines. If one would carry the prognostication further, one might have said that in about April, 1915, the sixes would outnumber the fours in the matter of chassis models. Motor Age predicted 2 years ago that in spite of this seeming outstripping of the fours by the sixes in 1915, that this prob-

ably would not occur as it was to be expected that the percentage of sixes would begin to increase less rapidly within a short time, as those who were able to buy six-cylinder cars became supplied, and the demand therefore might be expected to fall off somewhat. Likewise it was to be assumed there always would be an active market for the four-cylinder car, and that both curves should commence to approach a horizontal, indicating a constant demand.

Such has proven to be the case, and the prediction of 2 years ago has proven true. It is worthy of note that the four-cylinder cars instead of decreasing at the rapid rate at which their percentage has dropped off previously have shown a greatly lessened drop. The percentage of fours among the 1914 chassis was 54 while that among the 1915 chassis is 51. This is a decrease of only 3 per cent during the past 12 months as against 8 per cent the 12 months previous to that and 16 per cent in 1912. In fact, 12 months ago, Motor fours in 1915 was 51 per cent, almost the exact figure that it has proven to be.

Bringing Up the Rear

The remaining 1½ per cent left by the fours and sixes is taken up by two eight-cylinder motors, which comprise 1 per cent of the chassis, and one two-cylinder motor, which comprises ½ per cent. It is to be expected that before the new season is out there will be a number of new eight-cylinder cars, which, in all probability, will inroach on the preserves of the sixes.



Relative proportions of one, two, four, five, six and eight cylinders for 6 years as based on the percentages of chassis models of each type for each year

The 1915 Small



FOURS UNDER \$1,000

Argo	\$295	Peter Pan..	685
Cycleplane .	350	McIntyre ..	695
Saxon	395	Sphinx	695
Rayfield ...	395	Dort	700
Trumbull ...	395	Pullman ...	740
Vixen	395	Scripps-Bth.	775
Ford	440	Briscoe	785
Kearns-Kar	450	Dodge	785
Monroe	460	Overland ..	795
Dile	485	Krit	850
Chevrolet ..	490	Chevrolet ..	860
Metz	495	Bauer	875
Partin	495	Empire	875
Herreshoff .	500	Allen	895
Grant	505	Buick	900
Remington .	595	R. C. H.	900
Twombly ...	600	Vulcan	975
Maxwell ...	670	Detroitler ..	985
Alter	685	Studebaker.	985

A GLANCE at the offerings of motor car manufacturers for the 1915 season is quite likely to leave one with the impression that a great part of the trade is turning toward the small car and particularly toward the light four-cylinder car. Although the price question is not the subject of this present discussion, the turn toward the small four can be best shown by considering the list of prices of the cars as the cost figure bears a very direct relation in most instances to motor size and car weight and at the moment may be taken as a criterion of these factors.

At this time last year, considerable space was devoted to the fact that there were six different cars which could be obtained at less than \$500, and that there were twenty which listed under \$1,000. This year those figures have doubled. There are twelve cars which list at \$500 or under and between thirty-five and forty whose price does not exceed \$1,000.

Perhaps in no better way than in the consideration of the new cars can this tendency toward the light four car be illustrated. A study of these will show that of the debutantes nearly all are cars which list at under \$500.

New Small Fours

These have been brought out to meet the trend of popular sentiment among the buyers toward the light, inexpensive car—inexpensive in both first cost and maintenance. Such are the Argo, Cycleplane, Trumbull, Vixen, Monroe, Kearns and Dile. Such also are Remington, Twombly, Alter, Peter Pan, McIntyre, Sphinx, Scripps-Booth, Pullman, Jr., Bauer, Chevrolet, Dort and Allen, all of which are either new cars or new models which can be obtained at less than \$1,000.

The swinging of the pendulum toward the light four is one which could be ex-

pected logically at this moment, in view of the strides which until the opening of European hostilities, had been made for the past two years in what is termed the light cars in Europe. Across the Atlantic, the necessity for the introduction of the small car was greater than it is in America just at this time. The dual reasons of the high price of fuel and the high taxation based on the cylinder diameter urged European motorists toward cars which would be deemed unreasonably under-powered in this country. These very small cars were more applicable to European roads than they are to American conditions, but some of the new American small fours approach very closely in cylinder dimensions in some extent to the general design of the typical European light car.

Many of this year's small fours are developments of original cyclecar designs, but in nearly every instance have lost almost entirely any cyclecar characteristics which might indicate an origin from that source. Cyclecar design certainly had an effect upon the new light fours, but in general the effect can be considered as a good one in that it developed light and low-priced constructions, which otherwise might not have appeared.

The Saxon and Grant, together with the Ford and Metz, which were last year's pioneers in this field, the two last mentioned being older ones, and the Saxon and Grant being newcomers last year, have blazed a trail which is being followed, in certain respects, at least, by all of the new small fours. There are certain features which may be considered almost universal among these cars. One of these, and the one which makes the small four, is the unusually small cylinder dimensions; another is the block casting of the cylinders.

Engines Still Smaller

In the matter of cylinder dimensions we find still smaller motors than were in existence one year ago. The Saxon, which held the record for small engines last year with its 2½ by 4-inch cylinders, has yielded to a number of smaller ones which have appeared for the 1915 season. The Argo, which is the cheapest car listed, has the cylinders of only 2½ by 4. The Cycleplane cylinders are 2½ by 4. The most popular size of bore for these very small fours is 2¾. Among the cars employing this cylinder diameter are Grant, Peter Pan, Rayfield, Remington and Vixen. This gives a horsepower rating of 12, according to the S. A. E. formula, but in nearly every case it may be taken for granted that the actual power developed by the motor is somewhat greater than that. Four inches is quite the most popular length of stroke among these very small models, al-

though the Herreshoff has a stroke of only 3¼ inches and the Peter Pan is 4¼, while the Rayfield is 4½.

Among the small fours of somewhat larger size than the minimum class the bore ranges between 3 and 4 inches, the average being probably very close to 3½, while the stroke varies from 4 to 5¼ inches and averages in the neighborhood of 4¾. This 3½-inch bore gives a horsepower rating of 19.6 horsepower, according to the S. A. E. formula, and the most of these cars are called "twenties" or "twenty-fives" by their makers, a figure which probably is not far from the power actually developed by the motor when running somewhere near their maximum speed.

Designed for Higher Speed

Instead of the 1,000-foot piston speed upon which the S. A. E. rating is calculated, some of these motors can operate at considerably higher piston speed and thus develop a little more than their rated horsepower. This is made possible by the design which is evidenced, in some of the cars, at least, to produce moderately high-speed engines by keeping the weight, the pistons and connecting rods down as low as possible and by taking particular pains in the balance of the reciprocating parts to reduce vibration. This also is assisted by use of the rather large, sturdy crankshafts and by liberal bearing surfaces.

As is usual where block casting is the rule, detachable cylinder heads also are much in favor, the cylinder heads being in the form of a single plate, which covers all four cylinders and is removable as a unit.

Unit power plants, that is, the incorporation of clutch and gearset with the motor, are employed on the majority of the small fours.

Among the smaller fours, ignition is from a single source of current and usually the lighting and cranking battery is employed by means of a distributor which has the feature of automatic spark advance. In some instances a high-tension magneto alone is employed, leaving the battery to perform the functions of starting and lighting only.

The 1915 Small

SIXES UNDER \$1,700

Grant .....\$750	Auburn .....1,550
Saxon .....785	Hudson .....1,550
Monarch ....1,250	Moon .....1,575
McIntyre ...1,275	Mitchell ....1,585
Herff-Brooks 1,375	Chandler ...1,595
Studebaker ...1,385	Velle .....1,595
Meteor .....1,395	Lewis .....1,600
Paige .....1,395	Buick .....1,650
Chalmers ....1,400	Chalmers ....1,650
Overland ...1,475	Jackson .....1,650
Haynes .....1,485	Jeffery .....1,650
Enger .....1,495	Kissel .....1,650
Paterson ...1,495	Oakland .....1,685

WE talk about "six-thirties" now in the same way that we used to roll alliterative "six-sixties" on our tongues. Who knows but that in a few years we will be talking about "six-fifteens"? When we do, the pride expressed will not be on account of the world of brute power that we took such pleasure in in the days of six-sixty, but on account of the smooth, easy softness of the watchlike mechanism under the hood which will make a drop of gasoline go six or eight times as far as it used to in the days of the 60-horsepower monsters. We are getting away from the gasoline-eating, tire-eating of our former leviathans of speed, but not from the mile-a-minute qualities which were supposed to be their chief reason for existence.

Instead of making the motors bigger we have made them lighter, we have made them faster in piston speed and with that, the cars as a whole have become lighter without losing either in their pulling capabilities or the speed capabilities of the car as a whole. At the same time, the sixes have become easier on the pocketbook in first cost and in maintenance cost.

The same demand for economy of operation which permeates the motor car field as a whole is infused in the six-cylinder market and it has been the endeavor of designers of the new sixes to produce cars which can compete favorably with the fours on a basis of first cost, gasoline consumption and tire mileage.

Nine Under Last Year Record

One of the chief developments of the year is the surprising increase in the number of light sixes of comparatively small size and of usually low price. There are two six-cylinder cars announced for the 1915 season to sell completely equipped at less than \$800, the Grant at \$750, or \$795 with electric equipment, and the Saxon at \$785. The price of the Grant is exactly one-half that of the lowest price of six-cylinder car announced at this time last year. This was a Richmond, which listed at \$1,500. Next to it came the Lewis and

Meteor, each at \$1,600. For the new season, there have been nine announced already to sell at less than last year's cheap-

1915 SIX-CYLINDER CARS

Name and Model	Bore & Stroke
Abbott-Detroit, 50-60 F.....	3.750 x 5.250
Apperson, 6-45.....	3.500 x 5.125
Apperson, 6-60.....	4.125 x 5.000
Apperson, 6-60.....	4.125 x 5.000
Apperson, 6-60.....	4.125 x 5.000
Auburn, 6-40.....	3.500 x 5.000
Auburn, 6-47.....	3.750 x 5.250
Austin, 66.....	4.500 x 6.000
Chadwick, 19.....	5.000 x 6.000
Chadwick, 19.....	5.000 x 6.000
Chalmers, New 6.....	3.125 x 5.070
Chalmers, 26-B.....	3.500 x 5.500
Chalmers, Master 6.....	4.000 x 5.500
Chandler.....	3.375 x 5.000
Cole, 6.....	4.250 x 5.250
Cole, 6-50.....	3.500 x 5.000
Crawford, 6-35.....	3.500 x 5.000
Crow-Elkhart, E.....	3.750 x 5.500
Davis, 6-50.....	3.375 x 5.250
Enger, Six-50.....	3.500 x 5.000
Flat, 50.....	4.330 x 5.905
Firestone-Col., E, E.....	4.125 x 5.250
Franklin, 6-30.....	3.625 x 4.000
Grant, T.....	2.875 x 4.250
Haynes, 30.....	3.500 x 5.000
Haynes, 31.....	4.250 x 5.500
Herff-Brooks, 6-50.....	4.000 x 4.500
Hudson, 6-40.....	3.500 x 5.000
Hudson, 6-54.....	4.125 x 5.250
Imperial, 56.....	3.750 x 5.250
Jackson, 6-48.....	3.500 x 5.000
Jeffery, 6.....	3.375 x 5.250
Jeffery-Chesterfield.....	3.500 x 5.000
Kissel, 42.....	3.625 x 5.500
Kissel, 6-48.....	4.000 x 5.500
Kissel, 6-60.....	4.500 x 5.250
Kline, 6-42.....	3.500 x 5.125
Kline, 6-42-A.....	3.500 x 5.125
Lenox, 6.....	3.750 x 5.500
Lewis, 6.....	3.500 x 6.000
Lexington, 6-L.....	3.500 x 5.000
Lexington, 6-M.....	4.125 x 5.000
Locomobile, M-5.....	4.500 x 5.500
Locomobile, R-4.....	4.250 x 5.000
Luverne, 760.....	4.000 x 5.000
McFarlan, T.....	4.000 x 6.000
McFarlan, X.....	4.500 x 6.000
McIntyre, 6-40.....	3.500 x 4.500
Meteor, 45.....	3.750 x 5.000
Mitchell-Lewis, 6.....	4.000 x 5.500
Mitchell-Lewis, 7-6.....	4.250 x 7.000
Mitchell-Lewis, 5-6.....	4.250 x 6.000
Marmon, 41.....	4.250 x 5.500
Marmon, 48.....	4.500 x 6.000
Monarch, 6.....	3.500 x 5.000
Moon, 6-40.....	3.500 x 5.000
National, AA.....	3.750 x 5.500
Norwalk, F.....	3.500 x 5.125
Oakland, 49.....	3.500 x 5.000
Oldsmobile, 55.....	4.250 x 5.250
Overland, 82.....	3.500 x 5.250
Owen.....	3.625 x 5.500
Packard, 3-38.....	4.000 x 5.500
Packard, 5-48.....	4.500 x 5.500
Paige-Detroit, 6.....	3.500 x 5.250
Paterson, 6-48.....	3.500 x 5.000
Pathfinder.....	3.750 x 5.250
Peerless, 55.....	3.500 x 5.000
Peerless, 48.....	4.500 x 6.000
Pierce-Arrow, 38.....	4.000 x 5.500
Pierce-Arrow, 48.....	4.500 x 5.500
Pierce-Arrow, 68.....	5.000 x 7.000
Pilot, 55.....	3.500 x 5.250
Pilot, 75.....	4.500 x 6.000
Pratt, 6-50.....	3.750 x 5.250
Premier-Weidley, A.....	3.625 x 5.250
Pullman, 6-48.....	3.750 x 5.250
Reo, M.....	3.562 x 5.125
Republic, E.....	4.250 x 5.000
Saxon, B.....	2.875 x 4.500
Singer 6.....	4.000 x 5.500
Speedwell, 1.....	4.125 x 5.250
Stearns, 6.....	4.250 x 5.750
Stevens-Duryea, D-6.....	4.375 x 5.500
Stevens-Duryea, DD-6.....	4.437 x 5.500
Studebaker, 6.....	3.500 x 5.000
Stutz, 6.....	4.000 x 5.000
Stutz, 6.....	4.000 x 5.000
Touraine, 12.....	4.000 x 5.500
Touraine, 12.....	4.000 x 5.500
Velle, 14.....	3.750 x 5.250
Velle, 15.....	3.500 x 5.000
Wescott, U.....	3.500 x 5.000
White, 60.....	4.250 x 5.750
Winton, 21.....	4.500 x 5.500
Winton, 21A.....	4.375 x 5.250

est six, and there are fifteen all told which are less than \$1,600 in price.

Along with this price reduction there has been naturally a commensurate decrease in the size of the cylinders. Last year's smallest six was the Chandler, with a 3½ by 5 engine. This year there are two with a bore less than 3 inches, the Grant with its 2⅞ by 4¼ and the Saxon with the same bore and the stroke ¼ inch greater. In addition, there is the new Jeffery Chesterfield with its 3 by 5-inch engine. At least eight have a bore of 3½ inches and the stroke 5¼ or 5 inches. The most popular size of the new sixes seems to be the 3½ by 5 and among those of this dimension are the Auburn, Cole, Crawford, Enger, Haynes, Hudson, Jackson, Lexington, Monarch, Moon, Oakland, Peerless, Studebaker, Velle and Westcott.

This is quite a reduction in engine size from that of the 1914 season, whose favorite size was 3¾ by 5¼, with the 3¾ by 5 and the 4 by 5 engine tied for second.

Sixes Are Lighter

The new makes of sixes in every instance but one have a smaller engine than the average of last year. Exclusive of the Grant and the Saxon, the smallest of these new ones are the Enger, Lexington, Monarch with 3½ by 5 engines. Overland and Paige have 3½ by 5¼ and the Reo has 3 9/16 by 5¼.

Even more pronounced than the diminishing size in cylinders is the decrease in horsepower rating, although it is doubtful if the actual horsepower rating is greatly less than that of earlier models of larger dimensions. The 3½ by 5 engine, which seems to be the popular one this year, has a horsepower rating of only 29.4 at 1,000 feet per minute piston speed, according to the S. A. E. formula. The 3¾ by 5¼ engine, which was last year's favorite, rated officially at 33.8 horsepower.

In addition to the chief step in the direction toward the use of smaller cylinders, which has resulted in a reduction of the piston displacement by 10 or 15 per cent, there has been a tendency for many years toward excess of stroke over cylinder diameter, and this is more pronounced in the new cars.

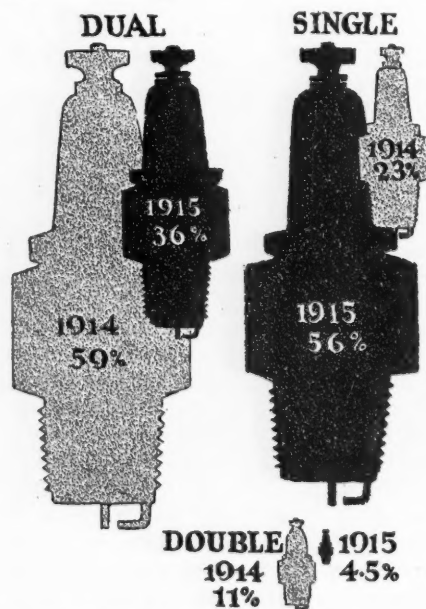


Analyzing the Motors

WATCHWORDS for 1915 in engine design seem to be smaller, lighter and more economical motors. For the past 4 years, motor car engineers have been decreasing the cylinder bore of their engines and simultaneously have been increasing the piston stroke. 1915 engines have a smaller cylinder bore on the average than ever before, but, strange as it may seem, the length of the stroke is considerably less than that of the average 1914 engine. This unexpected falling off in the average stroke has been brought about by the general movement toward very small fours and sixes and to a very slight extent by the eight-cylinder, all of which have engines whose bore and stroke both are considerably less than has been general practice previously.

Stroke-Bore Ratio Greater

The falling off in the stroke may be taken at first glance to mean a loss in prestige for the long-stroke idea, but this is not the case. The ratio of stroke to bore being greater this year than it has ever been before.



Growth of single ignition—and decrease of dual ignition—1914 in gray and 1915 in black

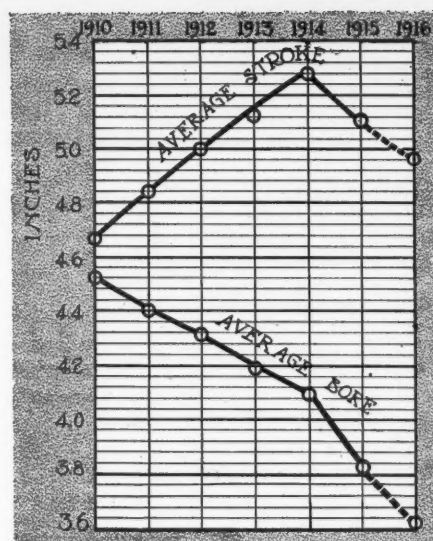
To get down to actual figures in comparing the 1915 motors with those of 1914, we find that the bore of the average motor of the past season was 4.12 inches or almost exactly $4\frac{1}{8}$ inches. The average bore of 1915 cylinders is considerably less than 4 inches, being 3.829 to be exact, or a little over $3\frac{7}{8}$ inches. The stroke likewise has decreased from 5.28, or just over $5\frac{1}{4}$ inches, in 1914 to 5.107 or $5\frac{1}{8}$ in the 1915 models. The average ratio of the stroke to bore in motors for the season just closed was 1.28 to 1 while that of the new season's engines is 1.33 to 1, that is, instead of the stroke being $\frac{1}{4}$ greater than the bore as in the 1914 average car, the new motors have a stroke averaging $\frac{1}{8}$ greater than the bore.

Naturally, the rather pronounced reduction in cylinder bore gives an almost corresponding reduction in the horsepower as calculated by the S. A. E. formula, and the horsepower of the 1915 cars as calculated by the formula is 29.97 instead of 33.22, the horsepower average of 1914. Had it not been for the increased proportion of six-cylinder cars and the very slight effect of the eights, the drop in horsepower would have been slightly greater.

Smaller Displacement the Rule

Along with the drop in average bore and stroke, there has come a corresponding reduction in the piston displacement, one which is rather greater than might have been expected a year ago. In fact, until the present season, the piston displacement has increased steadily from 281 cubic inches in 1910 to 349 at the beginning of the 1914 season. But the 1915 average displacement dropped off to 307.38 cubic inches, almost to its 1910 figure. It is significant that the average piston displacement of the 1915 cars comes so close to the displacement limit of 300 inches for racing cars in most of next season's events.

Until the appearance of the 1915 model the different types of cylinders and valve locations had not shown much change. The T-head cylinder, that is, with valves on either side, had held about 30 per cent of the field, and the L-head with both valves

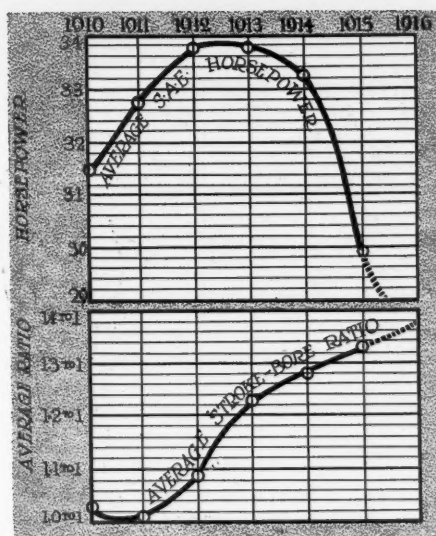


Variation of the average bore and stroke of engines for 6 years and what may be expected in 1916

on the same side had been nearly steady in the neighborhood of 60 per cent. The valve-in-the-head type had fallen off slowly to 6 per cent and the Knight had risen in favor from its appearance in the 1911 models to 3 per cent of the field in 1914.

This season, however, the L-head shows a very pronounced increase in percentage during the past 12 months, jumping from 59 to 70 per cent, likewise the overhead-valve type has shown a tendency to come back to its former popularity and now claims 8 per cent of the field. The T-head cylinder has dropped off proportionately with the growth of the L-head, falling from 30 per cent to 16½ per cent in the past 12 months. The Knight sliding-sleeve-valve engine does not show a comparative loss. In fact early announcements of two low-priced Knights will indicate a pronounced gain.

There are potent reasons for the changes just enumerated. Both the L-head and overhead cylinder constructions not only are lighter but are cheaper than the T-head design and the present tendency toward both low weight and low cost have rendered it necessary in many instances to drop the more powerful or more efficient T-head design in favor of the L-head type. In some instances, instead of the L-head,



Average horsepower has been growing less—curve shows average S. A. E. H. P. for 6 years. Rate of stroke to bore has been increasing. Prophecies for 1916

the overhead type has replaced the T-head.

There always has been a diversity of opinion as to the best method of casting the cylinders. Heretofore there have been only four different arrangements of the castings; that is, casting the cylinders either separately in pairs, in threes or all four or six cylinders in a single block. Now a new factor has entered this discussion to complicate matters. This is the method of casting in fours as applied to eight-cylinder engines.

Block Casting Gains

At the present moment, this factor is not an important one but is likely to become important in later years. The two eight-cylinder engines which comprise 1 per cent of the chassis models both have their cylinders cast in two blocks of four each. To get into the more common types of engines, the fours and sixes, block casting has dominated the field in a single leap. Claiming only 39 per cent of the 1914 situation, block casting has jumped to 67 per cent for the 1915 season.

The rise in the block casting can be attributed chiefly to the number of new light fours which have come out within the past year. In every case except one, these small fours have had block castings. To a certain extent also may the advancement

of the block idea be attributed to the light six. All of the new light sixes have taken advantage of block casting not only to lessen the cost but simultaneously to cut down the weight of the motor. The mere fact that cylinder dimensions of both fours and sixes are so much smaller has made the block casting possible in so many instances. Where cylinders of large dimensions are used, a block of four becomes hard to cast, hard to cool and hard to handle.

In the matter of motor lubrication there is one outstanding feature. This is the gain in popularity of oiling by a pressure system. The exact figures show that from 18 per cent in the 1914 model, pressure feed has increased to 37.5 per cent. This has been wholly at the expense of the combination splash-pressure systems which have dropped 39 to 16 per cent in the past year. The simple splash system, which always has been a feature of the majority of the cars, has shown a slight gain from 42 per cent in 1914 to 46.5 per cent in the 1915 models. This is in the face of the fact that during the 4 years preceding, the tendency has been downward so far as the pure splash was concerned.

This seemingly anomaly of a simultaneous gain in both the cheapest and most expensive of three systems at the expense of a combination system which combines some of the advantages of both at a reasonable cost can be explained by the two different tendencies in 1915 motors. One of these is the speeding up of the motor, a designing for higher piston speed than formerly had been employed. Such speeds have necessitated the use of a more positive lubrication than that obtained by the combined system even at the disadvantage of

greater cost. On the other hand the tendency toward the low-priced car has given the simple and inexpensive splash system a rather unexpected boost.

To obtain the power increase, many changes have been made and the one of greatest importance is the reduction of weight of the reciprocating parts. This year the average motor has much lighter pistons and rods than the 1914. A thinner section is used for the piston and the strength of the material improved.

In the matter of connecting rods, the only tendency which has shown itself, aside from weight reduction, has been the adoption by some makers of hollow rods. The Moline-Knight company used this type in 1914 in its four-cylinder Knight engine, but recently a number of other makers have taken up this form of rod.

Valve sizes have been increased in a great number of instances as a means of obtaining more power.

Valve Improvements

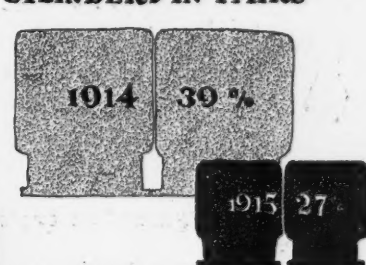
Aside from changing the valve size, quite a few makers, who care little for cost, have adopted tungsten-steel valves. This type of valve is not as liable to become pitted as the conventional type.

In carbureters we find quite a number of motors feeding the mixture through a cored passage in the casting in order to get the benefit of the heat in the cylinder, bring the carburetor to a more accessible position and do away with a long external inlet manifold. In practically every instance the primary air inlet to the carburetor is fed hot air from a tube, the end of which is clamped around the exhaust manifold. These are points which have helped considerably to make the motors manifold.

CYLINDERS CAST IN BLOCK



CYLINDERS IN PAIRS



Block casting of cylinders compared with pair casting for 2 years—1914 in gray and 1915 in black

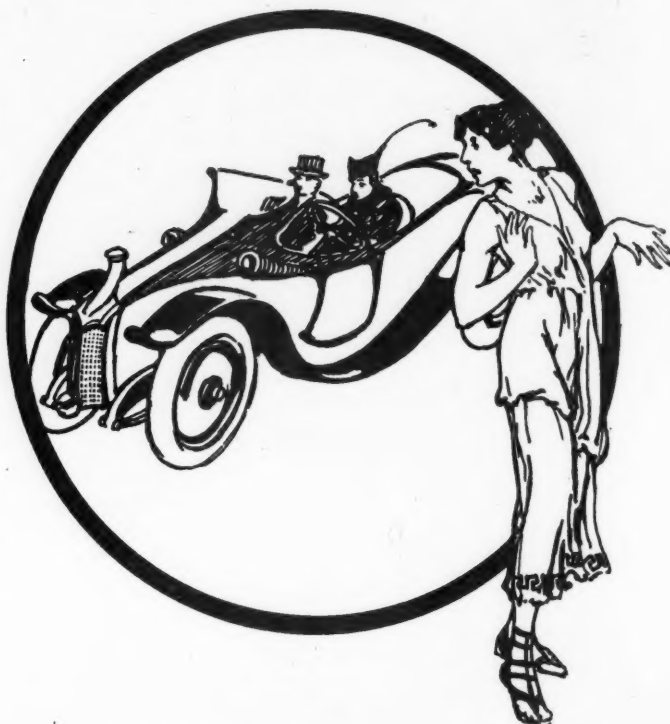
Alice in Motorland

By J. C. Burton



"The time has come," the walrus said, "to talk of motor things, Of one-man bores, of long-stroke tops, of sleeve-valve piston rings":
So Alice and the Cheshire Cat assumed the scholar's mien
As lantern slides, a la B. Holmes, were thrown upon the screen.

"The streamline body here is shown," the walrus wisely said, "The car with angles is passé, they're made with curves instead;
The curves are there for pulchritude, to make the eyesight glad,
They're curves that Bill James never pitched, that Venus never had."



The walrus danced a tar's hornpipe and shed a salty tear,
As on the screen another view did suddenly appear;
"The boat type body," he declared, "this year makes its debut,
And since it's very nautical, it's painted marine blue."



"The present engines," he explained, "are not like those of yore;
Now here is Motor's David, which is shown as Smaller Bore,
An engine that will do the work at great economy
And cut the yearly dividends accruing to John D."





"The days of cuddling closer in the front seat of a car
Are past and Cupid's prospects have received an awful jar;
The seat is bifurcated by the chaperon's decree
And holding hands in secret is not what it used to be."

"Bill, turn the crank! Now, here we have a vehicle extinct.
The tandem-seated cyclecar and Motor's missing link;
No longer does it draw the crowd to storm the dealer's door
And in the space it occupied, we find the little four."



"Of all the innovations in the 1915 crop,
The one that gets the medal is the simple one-man top;
The wizard who invented it is greater than Herr Krupp—
It does not take a circus gang to get the blamed thing up."



"A marvel of monstrosity, the greatest of the great,
Is now on view. Observe its lungs, they number—count 'em
—eight";
The walrus paused as Alice cringed and shuddered in her
fright:
The movie operator flashed the well-known slide "Good
Night."



Making the Dollar Go a Long Way



COST of living may be on the increase as we hear every day, but there is one thing that makes life worth the living that is not on the upgrade from the viewpoint of the pocketbook. Motoring is the exception to the high-cost-of-living trend.

Each year finds the dollar accomplishing more in the purchase and operation of a motor car than did any previous year. The 1915 motorist will find that he gets more car for his money and that it costs him less to run than it did in 1914, or

than it did 2 years ago. In size, the car will be no greater than formerly; in fact, it will be smaller than last year's car in point of engine size and car weight. But it will seat as many people comfortably.

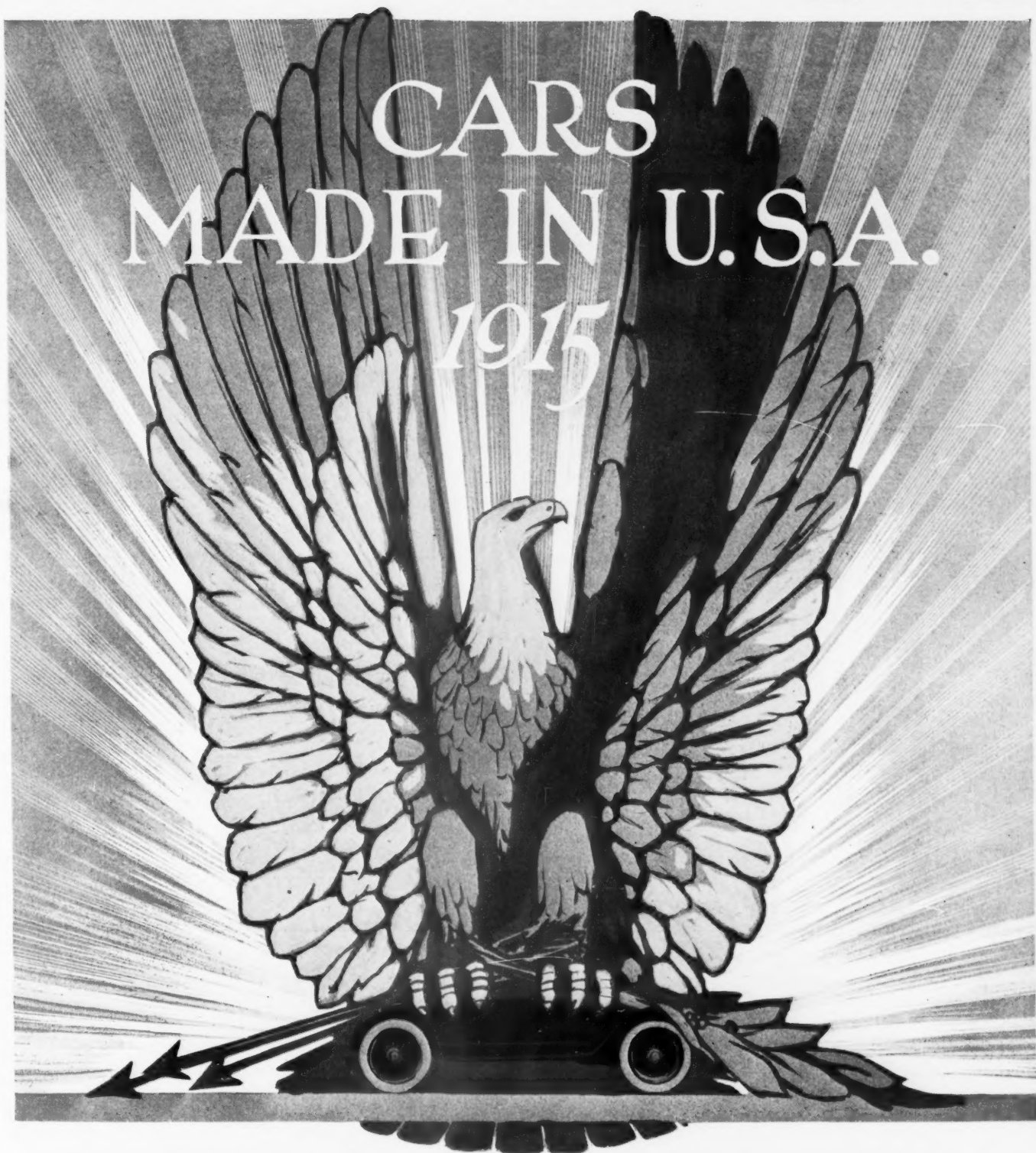
But the chief feature in the more-car-per-dollar movement of the year is in the increased amount and quality of the equipment—aside, of course, from the better quality of the cars themselves which has been dwelt on previously. Two or three years ago the purchaser of a car found it necessary, if he wanted to be completely equipped, to invest a considerable amount in accessories before he could consider his

car ready for touring. Nearly always he had to purchase spare tire holders, trunk racks, etc., and quite frequently he found that the top and, sometimes, even the windshield were additional to the list price of the car. Demountable rims were extra equipment and if he was so luxuriously inclined as to want electric lighting or a self-starter, he had to dig quite deeply into his pocket.

Nowadays the car that does not carry a spare demountable rim on a spare tire rack, does not have electric lighting and cranking, that does not have a one-man type of top, and some form of quick-operating curtains is likely to be considered anything but a complete car. The ease-loving motorist of 2 or 3 years ago was wont to invest quite heavily in an air pump to inflate his tires. A great proportion of the 1915 cars come equipped at the list price with a tire inflater.

Comparisons of Features of the Average American Car for 6 Years

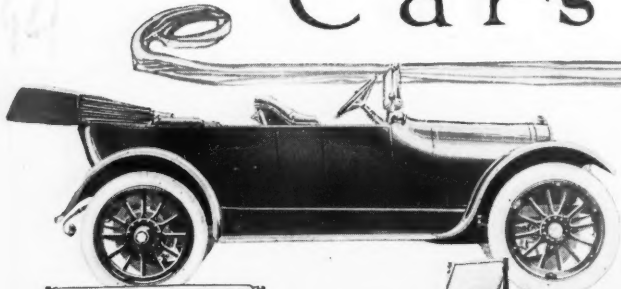
GENERAL AVERAGES	1915	1914	1913	1912	1911	1910
Horsepower, S. A. E. rating	29.97	33.2	33.60	33.60	32.7	31.5
Bore	3.82	4.12	4.19	4.34	4.42	4.85
Stroke	5.10	5.28	5.15	4.97	4.46	4.68
Stroke-bore ratio	1.33	1.28-1	1.23-1	1.09-1	1.01-1	1.03-1
Piston displacement	307.38	349	345	316.2	313.2	281.5
Wheelbase	122.19	121	122	121	114	112
Gear ratio	3.88-1	3.6-1	3.57-1	3.62-1		
Tires	34x4	35x4	35x4	35x4	34x4	34x4
Number cars	535	607				
Number chassis	200	236	339	381	393	364
Number makes	119	133	156	193	270	239
Price	\$2,005	\$2,635	\$2,585	\$2,508	\$2,560	\$2,214
PERCENTAGE	1915	1914	1913	1912	1911	1910
Number of cylinders						
One cylinder	0	0	0	1	1	5
Two cylinders	5	1	1	1	2	3
Four cylinders	51.4	54	62	78	80	82
Five cylinders	0	0	1	1	0	0
Six cylinders	47.5	45	36	19	17	10
Eight cylinders	1.0	0	0	0	0	0
Shape of cylinders						
T-cylinder type	16.5	30	31	30	22	20
L-cylinder type	70.0	59	56	55	60	56
I-cylinder type	8.5	6	9	9	14	18
Knight type	3.0	3	3	2	1	0
Two-cycle	1.0	1	1	4	3	6
Mondex-Magic type	0	1	0	0	0	0
Cylinder arrangement						
Cylinders cast separate	4.0	6	15	22	28	39
Cylinders cast in pairs	27.0	42	48	58	60	53
Cylinders cast in block	67.0	39	29	18	12	8
Cylinders cast in threes	10.0	13	8	2	0	0
Cylinders cast in fours (eights)	1.0	..	..	..	..	..
Cooling						
Air-cooled	5	2	4	5	6	7
Thermo-siphon	27	19	17	19	28	23
Pump circulating	72.5	79	79	76	66	70
Ignition systems						
Single ignition	56	23	15	14	18	25
Dual ignition	36	59	68	63	53	40
Two-spark ignition	1.45	4	2	0	0	0
Double ignition	4.55	11	15	23	29	35
Duplex ignition	2.0	3	0	0	0	0
Motor lubrication						
Splash oiling	46.5	42	53	68	81	0
Splash-pressure oiling	16	39	32	20	0	0
Oil in fuel	0	1	1	2	3	6
Pressure oiling	37.5	18	14	10	19	0
Engine starting						
Electric starter	94.5	87	37	2	0	0
Acetylene starter	0	1	14	0	0	0
Air starter	0	4	9	2	1	1
Optional starter	1.5	2	5	0	0	0
Mechanical starter	.5	1	4	0	0	0
No starter as stock	3.5	5	31	98	99	99
PERCENTAGES	1915	1914	1913	1912	1911	1910
Fuel feed						
Gravity fuel feed	57	58	65	0	81	82
Gravity-pressure fuel feed	.5	1	0	0	0	0
Pressure fuel feed	22	41	35	0	19	18
Vacuum Feed	20.5	0	0	0	0	0
Gas tank location						
In cowl	27.2	13	..	..	..	..
At rear	51.1	41	..	..	..	..
Under seat	21.2	46	..	..	..	..
Type of clutch						
Disk clutch	51	48	52	44	51	49
Cone clutch	44	41	45	52	47	39
Expanding band clutch	.5	3	1	3	2	6
Contracting band clutch	4.5	5	2	1	1	3
None	..	3	..	..	..	..
Type of gearset						
Selective	91.5	95	94	92	90	85
Progressive	3.5	1	2	5	1	8
Planetary	1.0	1	1	2	4	4
Friction	2.5	3	3	1	5	3
Location of gearset						
Amidship	32.5	39	46	55	67	75
Unit with axle	18.2	15	20	20	17	15
Unit with motor	49.3	43	34	25	16	10
None	..	3	..	..	..	..
Steering and control						
Right steering right control	9.5	24	58	70	81	93
Right steering center control	3	10	13	15	11	4
Left steering center control	79.5	57	25	13	6	2
Left steering left control	3.5	2	4	2	2	1
Optional steering	4.0	4	0	0	0	0
Electric gearshift (left steer)	0	3	0	0	0	0
Wheels						
Wire wheels—demountable	7.0	4	3	0	0	0
Wood wheels	88.5	96	96	100	100	100
Optional	4.5	0	0	0	0	0
Final drive						
Shaft and bevel	84.5	93	94	92	91	89
Chain	4.5	4	4	6	8	11
Shaft and worm	1.5	1	1	1	0	0
Roller	0	1	1	1	1	0
Shaft and worm-bevel	9.5	1	..	..	..	..
Type of axle						
Floating	58.5	65	67	50	0	0
Semi-floating	23.0	17	26	49	0	0
Three-quarter floating	18.5	14	4	0	0	0
Seven-eighths floating	0	1	0	0	0	0
Dead rear axle	2.0	3	3	1	0	0
Timing gear drive						
Spur gear	16.1	13	83	..	..	..
Helical or spiral gear	73.7	77	10	..	..	..
Silent chain	9.1	10	7	..	..	..
Worm	1.1	0	0	0	0	0



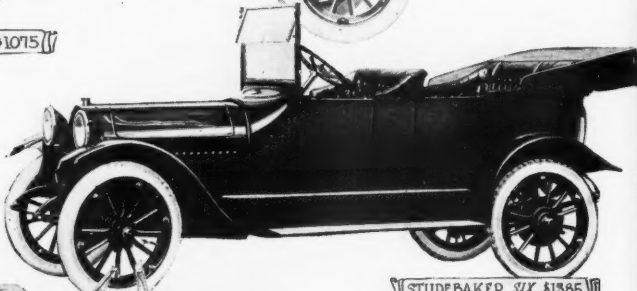
FOLLOWING its custom of reproducing annually representative cars with each of the various body types in a comprehensive illustrated review, Motor Age shows pictorially on the succeeding pages the open cars of 1915. A study of the designs will indicate the unusual advances that have been accomplished in the past twelvemonth in the external beauty of the vehicles for the season just commencing. A general redesigning of bodies is evident and in every case the result has been a great improvement artistically, while at the same time the equally important aspect of comfort for driver and passengers has been augmented.

It is doubtful that any previous similar period has shown as great improvements esthetically in car bodies as has the year just closed. Not that the changes have been so radical, but that they have been so generally adopted throughout the trade. The streamline idea which has been the moving force for the past year or two has been succeeded by a modification of this idea in what has come to be known as the boat type of body. This is the carrying out of the streamline motive to its source, watercraft. Not only have the smooth, easy lines, characteristic of streamlining been made more general in the car's exterior, but the sides of the body have been sloped up, somewhat after the marine practice and the upholstering has been kept below the upper edge of the body. The cowl curve is now a greater unity with the car lines.

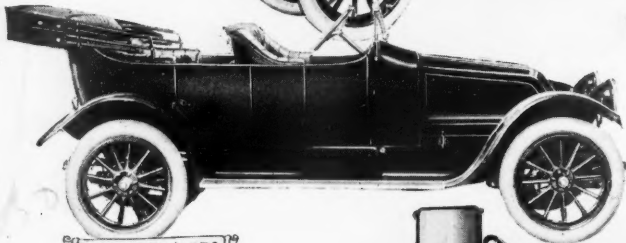
Cars Carrying



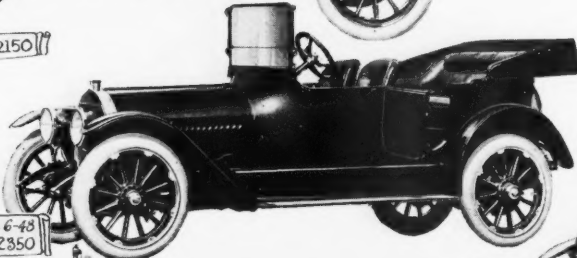
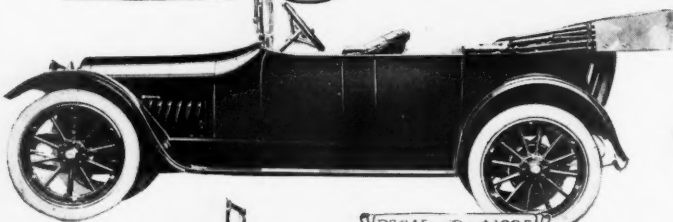
OVERLAND 80 \$1075



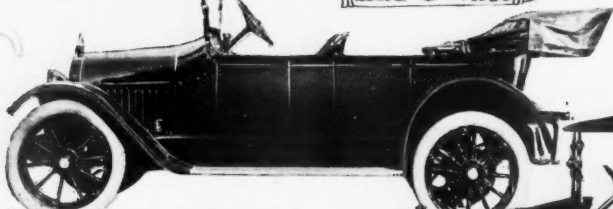
STUDEBAKER SIX \$1385



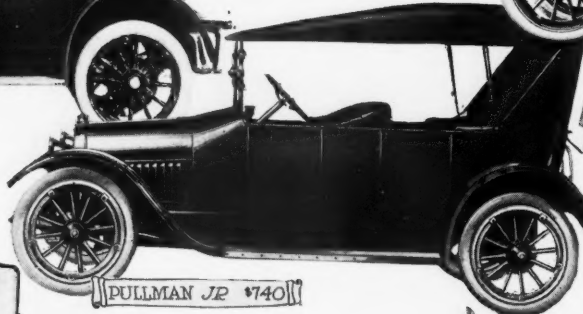
FRANKLIN \$2150

KISSELKAR 6-48
TWO-DOOR \$2350

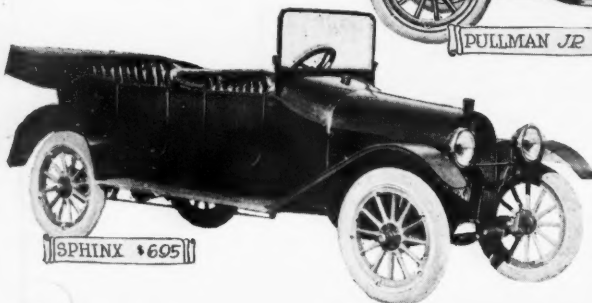
REGAL D \$1085



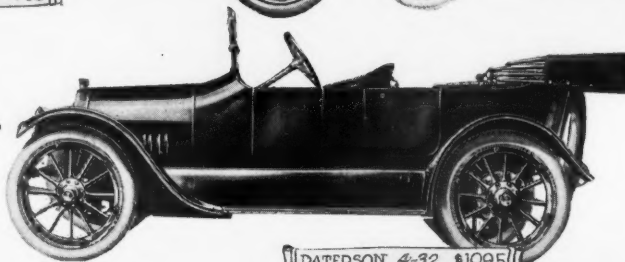
STEARNS-KNIGHT FOUR \$1750



PULLMAN JR \$740



SPHINX \$695

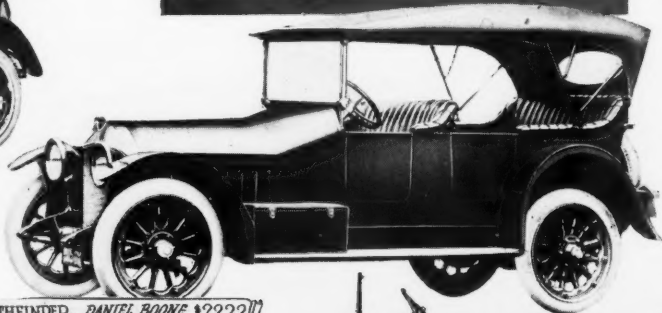


PATERSON 4-32 \$1095

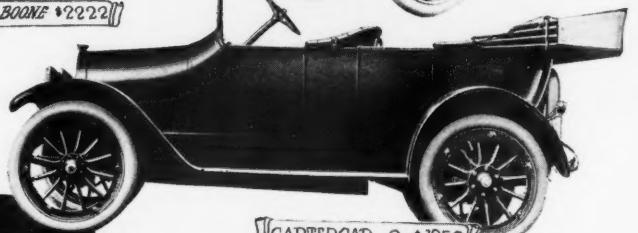
Five-Passenger Cars

This list of five-passenger cars is greater this year than ever before, this body size being the popular one in all prices of cars. There is a slight growth in popularity of four-passenger types, especially where narrow style of body is desired

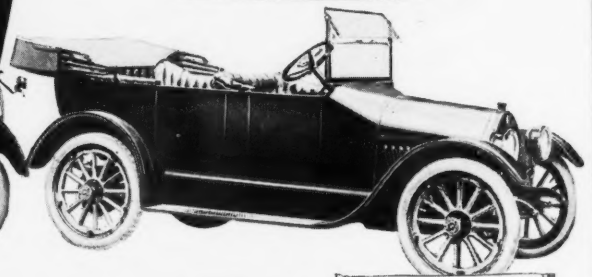
Overland, 80, \$1,075, Four, 4 1/2 x 4 1/2, 114 W.B., 34 x 4-inch tires.
Studebaker Six, \$1,385, Six, 3 1/2 x 5, 121 W.B., 34 x 4-inch tires.
Franklin, \$2,150, Six, 3 1/2 x 4, 120 W.B., 34 x 4 1/2-inch tires.
Kisselkar, 42-Six, Two-door, \$1,650, Six, 3 1/2 x 5 1/2, 126 W.B., 35 x 4 1/2 tires.
Regal, D, \$1,085, Four, 3 1/2 x 5, 112 W.B., 32 x 3 1/2-inch tires.
Stearns-Knight, Light Four, \$1,750 3 1/2 x 5 1/2, 119 W.B., 34 x 4-inch tires.
Pullman, Junior, \$740, Four, 3 1/2 x 4 1/2, 110 W.B., 30 x 3 1/2-inch tires.
Sphinx, \$695, Four, 3 1/2 x 5, 112 W.B., 30 x 3 1/2-inch tires.
Pathfinder, Daniel Boone, \$2,222, Six, 3 1/2 x 5 1/2, 125 W.B., 34 x 4 1/2 tires.
Cartercar 9, \$1,250, Four, 3 1/2 x 5, 106 W.B., 33 x 4-inch tires.
Empire, 31-40, \$975, Four, 3 1/2 x 4 1/2, 108 W.B., 32 x 3 1/2-inch tires.
Paterson, 4-32, \$1,095, Four, 3 1/2 x 5, 112 W.B., 33 x 4-inch tires.



PATHFINDER, DANIEL BOONE \$2222



CARTERCAR 9 \$1250



EMPIRE 31-40 \$975

Five Passengers



BUICK C-25 \$950

CADILLAC EIGHT TYPE 51 \$1975

PIERCE-ARROW 38 C-3 \$4300

PEERLESS ALL-PURPOSE FOUR \$2000

JEFFERY CHESTERFIELD SIX \$1650

OLDSMOBILE 42 \$1285

JACKSON OLYMPIC 46 \$1375

CRAWFORD 6-35 \$1850

DODGE \$785

PULLMAN 6-48 \$2350

APPERSON 4-40 \$1350

McFARLAN 75 \$2590

Buick, C-25, \$950, Four, 3 3/4 x 3 3/4, 106 W.B., 32 x 3 1/2-inch tires.

Peerless, All-Purpose, \$2,000, Four, 3 3/4 x 5, 113 W.B., 34 x 4-inch tires.

Oldsmobile, 42, \$1,285, Four, 3 3/4 x 5, 112 W.B., 33 x 4-inch tires.

Crawford, 6-35, \$1,850, Six, 3 1/2 x 5, 120 W.B., 34 x 4-inch tires.

Dodge, \$785, Four, 3 3/4 x 4 1/2, 110 W.B., 32 x 3 1/2-inch tires.

Apperson, 4-40, \$1,350, Four, 4 x 5, 116 W.B., 34 x 4-inch tires.

Cadillac, Type 51, \$1,975, Eight, 3 3/4 x 5 1/2, 122 W.B., 36 x 4 1/2-inch tires.

Pierce-Arrow, 38-C-3, \$4,300, Six, 4 x 5 1/2, 134 W.B., 36 x 4 1/2-inch tires.

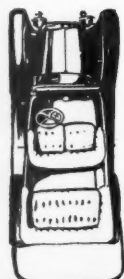
Jeffery, Chesterfield, \$1,650, Six, 3 x 5, 122 W.B., 34 x 4-inch tires.

Jackson, Olympic 46, \$1,375, Four, 4 1/2 x 5 1/2, 117 W.B., 34 x 4-inch tires.

Pullman, 6-48, \$2,350, Six, 3 3/4 x 5 1/2, 134 W.B., 36 x 4 1/2-inch tires.

McFarlan, 75, \$2,590, with Six, 4 x 6, 132 W.B., 36 x 4 1/2-inch tires, \$2,900, with Six, 4 1/2 x 6, 132 W.B., 36 x 4 1/2-inch tires.

Cars Carrying Five



MAXWELL



FRANKLIN



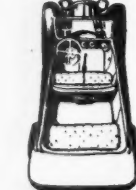
KRUT



HAYNES

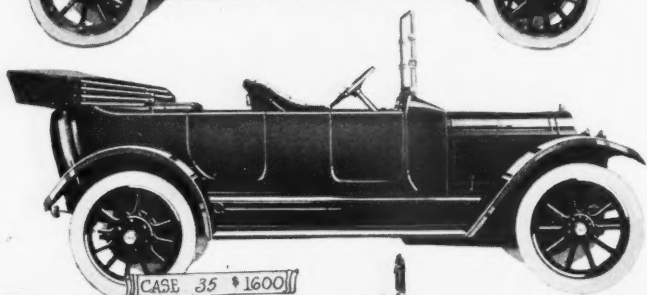
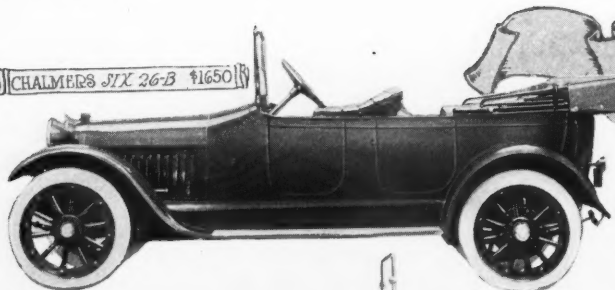


MERCER

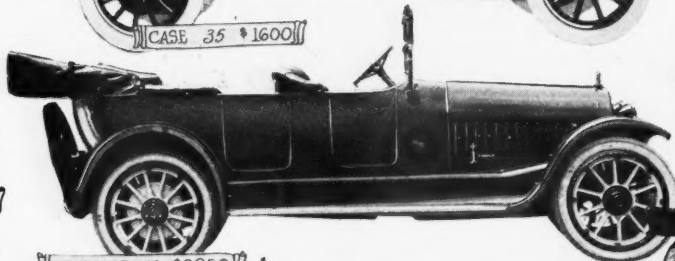


KING

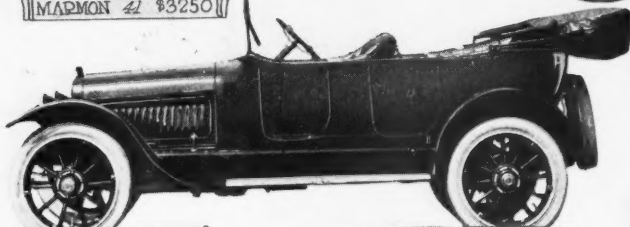
CHALMERS SIX 26-B \$1650



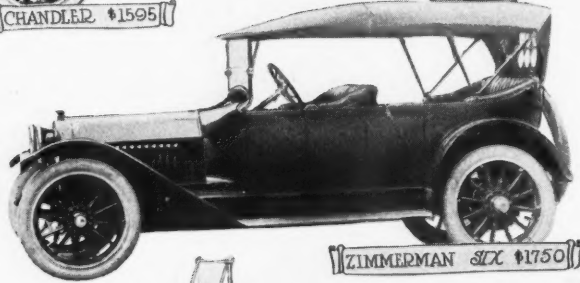
CASE 35 \$1600



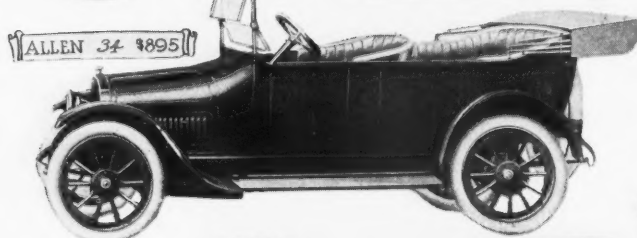
MARMON 41 \$3250



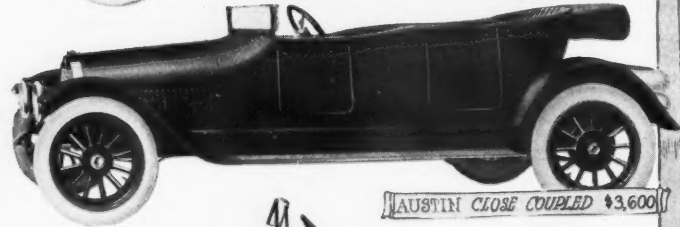
CHANDLER \$1595



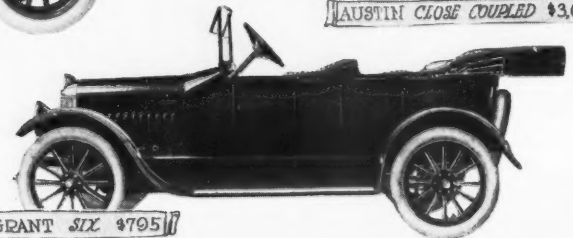
ZIMMERMAN SIX \$1750



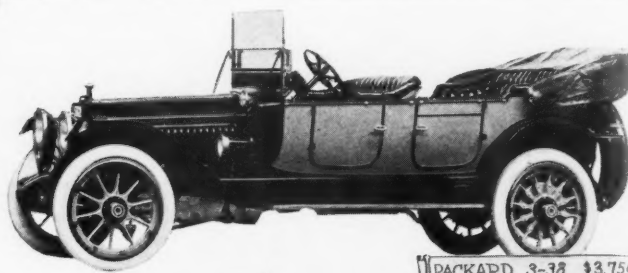
ALLEN 34 \$895



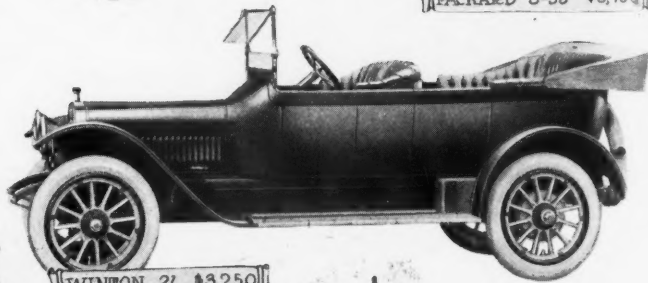
AUSTIN CLOSE COUPLED \$3600



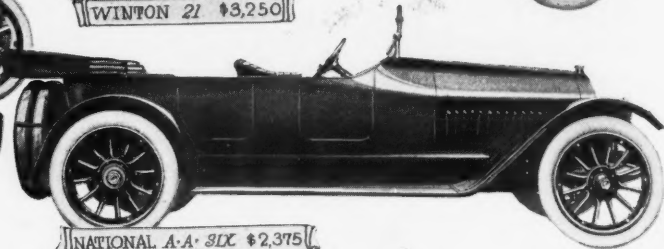
GRANT SIX \$795



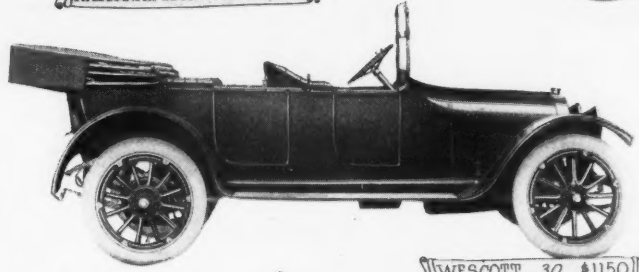
PACKARD 3-38 \$3,750



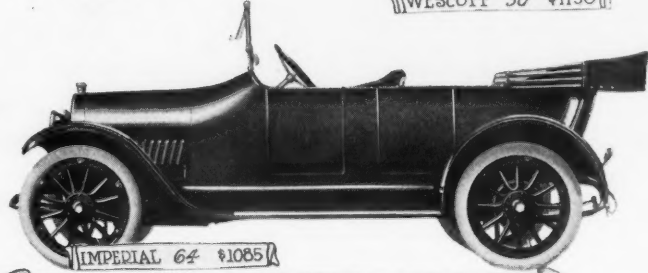
WINTON 21 \$3,250



NATIONAL A.A. SIX \$2,375



WESTCOTT 30 \$1150

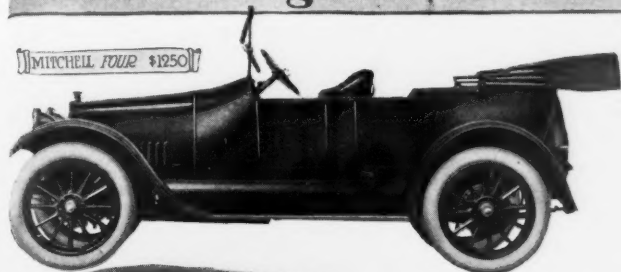


IMPERIAL 64 \$1085

Chalmers, 26 B, \$1,650, Six, 3 1/2 x 5 1/2, 125 1/2 W.B., 34 x 4 1/2-inch tires.
Case, 35, \$1,600, Four, 4 1/4 x 5 1/2, 120 W.B., 35 x 4 1/2-inch tires.
Marmon, 41, \$3,250, Six, 4 1/4 x 5 1/2, 132 1/2 W.B., 36 x 4 1/2-inch tires.
Chandler, \$1,595, Six, 3 3/4 x 5, 120 W.B., 34 x 4-inch tires.
Zimmerman, Six, \$1,750.
Allen, 34, \$895, Four, 3 3/4 x 5, 110 W.B., 32 x 3 1/2-inch tires.
Austin, Close-Coupled, \$3,600, Six, 4 1/4 x 6, 141 W.B., 34 x 4 1/2-inch tires.
Grant, Six, \$795, Six, 2 3/4 x 4 1/4, 106 W.B., 30 x 3 1/2-inch tires.
Packard, 3-38, \$3,750, Six, 4 x 5 1/2, 140 W.B., 37 x 5-inch tires.
Winton, 21, \$3,250, Six, 4 1/2 x 5 1/2, 136 W.B., 37 x 5-inch tires.
Westcott, 30, \$1,150, Four, 3 1/2 x 5, 113 W.B., 33 x 4-inch tires.
National, A. A., \$2,375, Six, 3 3/4 x 5 1/2, 132 W.B., 36 x 4 1/2-inch tires.
Imperial, 64, \$1,085, Four, 3 3/4 x 5, 117 W.B., 32 x 3 1/2-inch tires.

Passengers, Continued

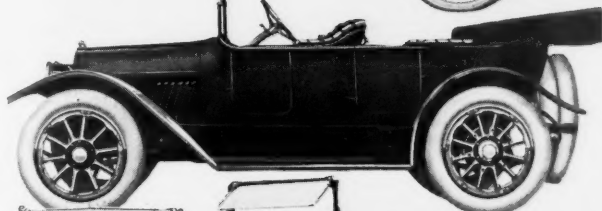
MITCHELL FOUR \$1250



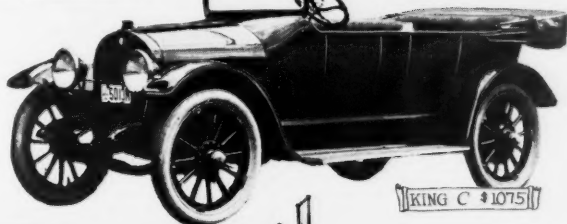
VELIE 15 \$1595



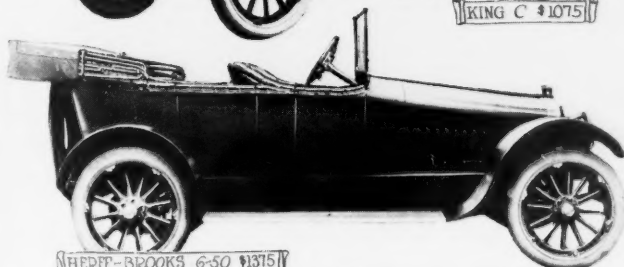
ABBOTT K \$1785



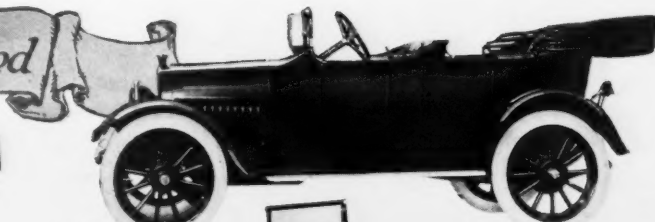
KING C \$1075



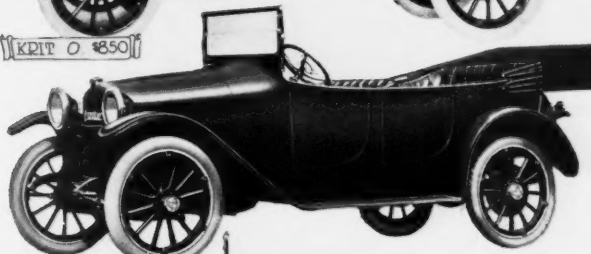
HERFF-BROOKS 6-50 \$1375



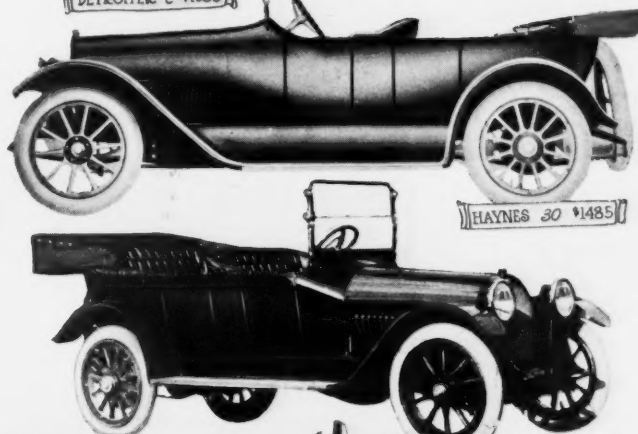
KRIT O \$850



DETROITER C \$1050



HAYNES 30 \$1485



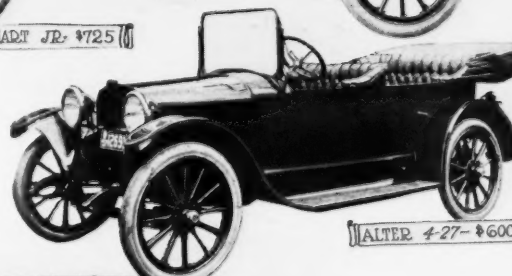
LEXINGTON 6-M-5 \$2575



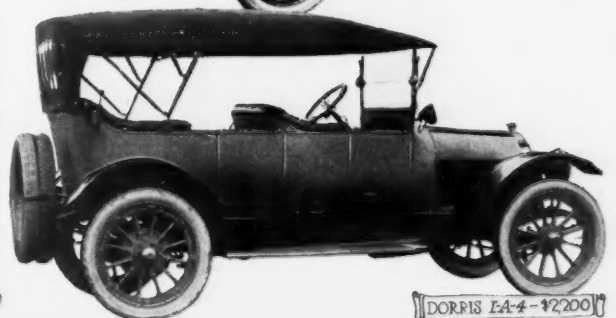
LAMBERT 48-C \$1200



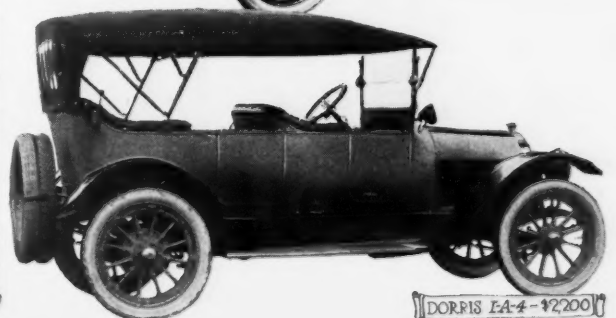
CROW-ELKHART JR. \$725



ALTER 4-27 \$600



DORRIS EA-4 \$2200



HUPMOBILE



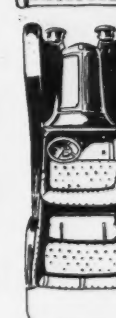
MITCHELL



CARTER CAR



NATIONAL



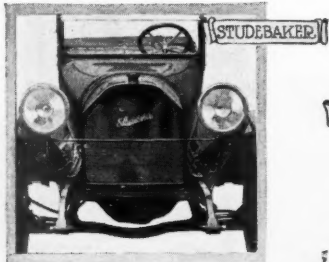
APPERSON



EMPIRE

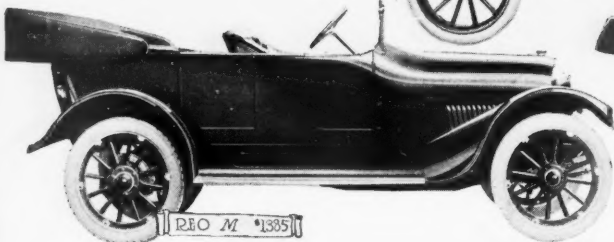
Mitchell, Light Four, \$1,250, Four, 4 x 5 1/2, 116 W.B., 34 x 4-inch tires.
 Velie, 15, \$1,595, Six, 3 1/2 x 5, 124 W.B., 34 x 4-inch tires.
 Abbott, K, \$1,785, Four, 4 1/4 x 5 1/4, 116 W.B., 34 x 4-inch tires.
 King, C, \$1,075, Four, 3 15/16 x 5, 113 W.B., 33 x 4-inch tires. Starter extra.
 Herff-Brooks, 6-50, \$1,375, Six, 4 x 4 1/2, 124 W.B., 34 x 4-inch tires.
 Krit, O, \$850, Four, 3 3/4 x 4, 108 W.B., 32 x 3 1/2-inch tires.
 Detrioter, C, \$1,050, Four, 3 1/2 x 5, 112 W.B., 32 x 3 1/2-inch tires.
 Haynes, 30, \$1,485, Six, 3 1/2 x 5, 121 W.B., 34 x 4-inch tires.
 Lexington, 6-M-5, \$2,575, Six, 4 1/4 x 5, 130 W.B., 36 x 4 1/2-inch tires.
 Lambert, 48-C, \$1,200, Four, 3 3/4 x 4, 112 W.B., 32 x 3 1/2-inch tires.
 Crow-Elkhart, Jr., \$725, 3 1/2 x 4 1/2, 104, 30 x 3 1/2.
 Alter, 4-27, \$600, with starter \$685, Four, 3 3/4 x 4 1/4, 106 W.B., 30 x 3 1/2-inch tires.
 Dorris, I A, \$2,200, Four, 4 1/4 x 5, 121 W.B., 36 x 4 1/2-inch tires.

Cars Carrying Five



STUDEBAKER

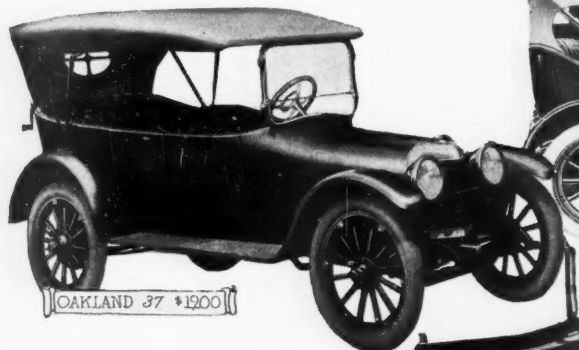
FORD T \$400



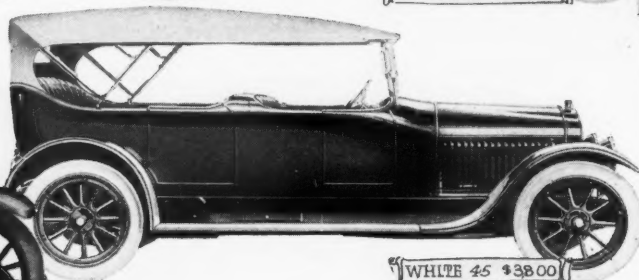
REO M \$1385



OVERLAND 82 \$850



OAKLAND 37 \$1200



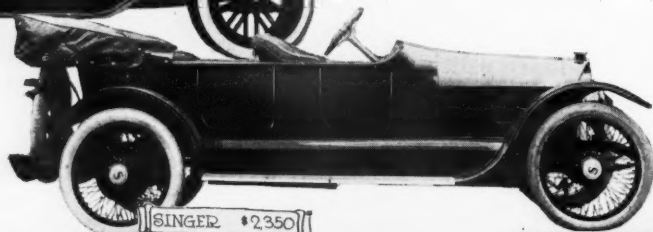
WHITE 45 \$3800



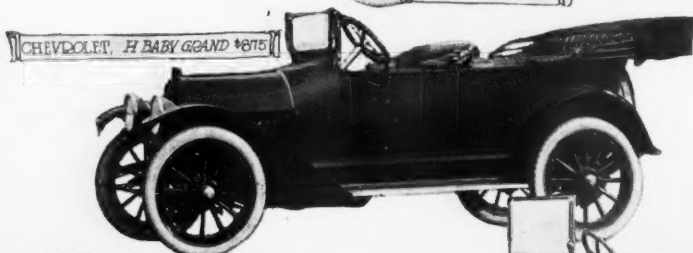
CASE 25 \$1350



KLINEKAR, 6-42 \$1750



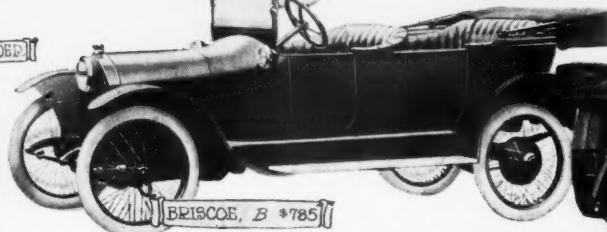
SINGER \$2350



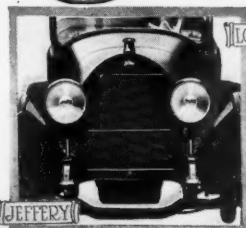
CHEVROLET, H BABY GRAND \$875



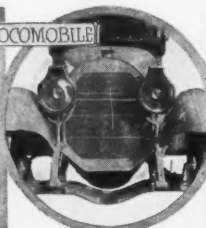
PATHFINDER



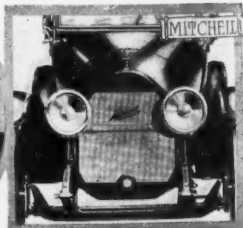
BRISCOE, B \$785



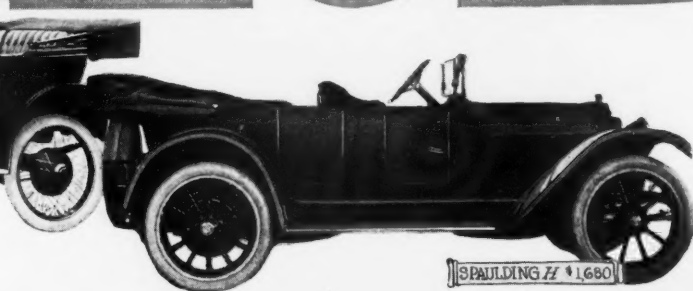
JEFFERY



LOCOMOBILE



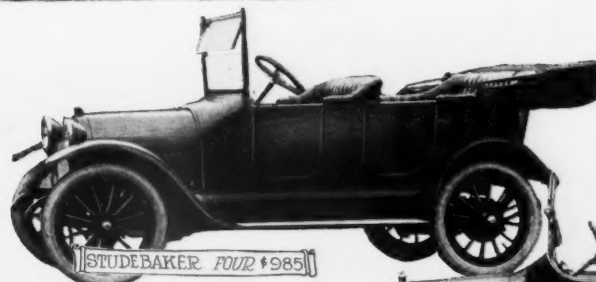
MITCHELL



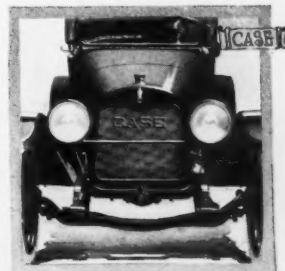
SPaulding H \$1680

- Reo, M, \$1,385, Six, 3 9/16 x 5 1/4, 122 W.B., 34 x 4-inch tires.
- Oakland, 37, \$1,200, Four, 3 1/2 x 5, 112 W.B., 33 x 4-inch tires.
- Klinekar, 6-42, \$1,750, Six, 3 1/2 x 5 1/4, 123 W.B., 34 x 4-inch tires.
- Case, 25, \$1,350, Four, 3 3/4 x 4 1/4, 115 1/2 W.B., 34 x 4-inch tires.
- Singer, \$2,350, Six, 4 x 5 1/2, 135 W.B., 36 x 4 1/2-inch tires.
- Chevrolet, H, Baby Grand, \$875, Four, 3 11/16 x 4, 106 W.B., 32 x 3 1/2-inch tires.
- Briscoe, B, \$785, Four, 3 3/4 x 5 1/4, 107 W.B., 30 x 3 1/2-inch tires.
- Ford, T, \$490, Four, 3 3/4 x 4, 100 W.B., 30 x 3 1/2-inch tires.
- Overland, 81, \$850, Four, 4 x 4 1/2, 106 W.B., 33 x 4-inch tires.
- White, 45-Touring, \$3,800, Four, 4 1/4 x 6, 132 3/4 W.B., 34 x 4 1/2-inch tires.
- Spaulding, H, \$1,680, Four, 4 1/4 x 5 1/4, 120 W.B., 36 x 4-inch tires.

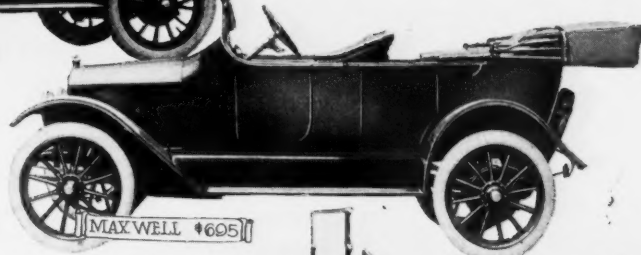
Passengers Continued



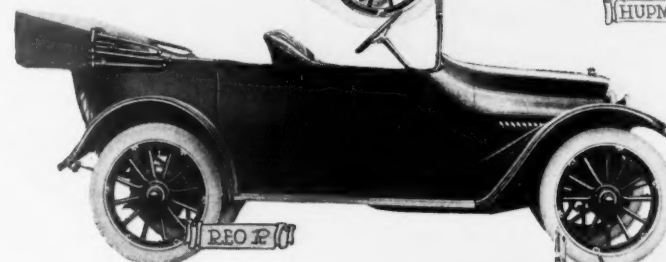
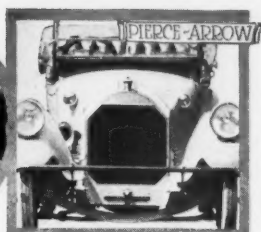
STUDEBAKER FOUR \$985



CASE



MAXWELL \$695



REO



MOON 4-38 \$1350

Glide, 30, \$1,195, Four, 3 1/2 x 5, 114 W.B., 32 x 4-inch tires.

R. C. H., \$900, Four, 3 1/2 x 5, 110 W.B., 32 x 3 1/2-inch tires.

Studebaker, Four, \$985, Four, 3 1/2 x 5, 108 W.B., 33 x 4-inch tires.

Maxwell, Touring, \$695, Four, 3 3/4 x 4 1/2, 102 W.B., 30 x 3 1/2-inch tires. Starter extra.

Hupmobile, K, \$1,200, Four, 3 3/4 x 5 1/2, 119 W.B., 34 x 4-inch tires.

Reo, R, \$1,050, Four, 4 1/2 x 4 1/2, 115 W.B., 34 x 4-inch tires.

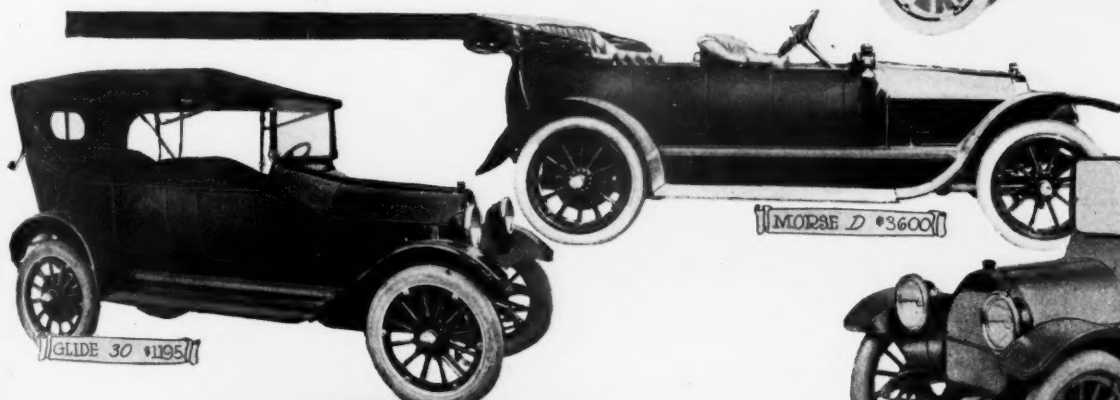
Moon, 4-38, \$1,350, Four, 3 3/4 x 5, 122 W.B., 34 x 4-inch tires.

Morse, D, \$3,600, Four, 4 3/4 x 5, 127 W.B., 36 x 4 1/2-inch tires.

Auburn, 4-36, \$1,075, Four, 3 3/4 x 5, 114 W.B., 32 x 4-inch tires.

Saxon, Six, \$785, Six, 2 7/8 x 4 1/2, 112 W.B., 32 x 3 1/2-inch tires.

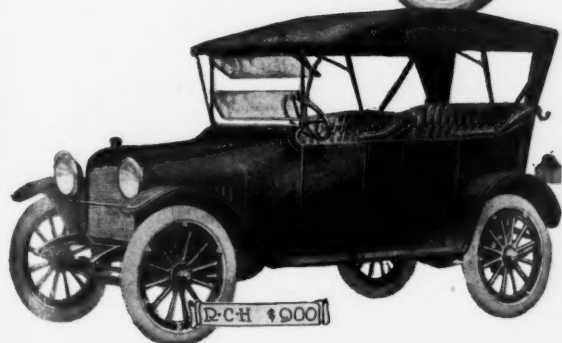
In addition to these, the following cars are made in five-passenger form but are not illustrated as such: Arbenz, Bauer, Chadwick, Corbitt, Davis, Enger, Fiat, Firestone, Great Western, Inter-State, Locomobile, Lyons-Knight, Meteor, Moline, Monarch, Paige, Pratt, Republic, Stevens-Duryea, Touraine.



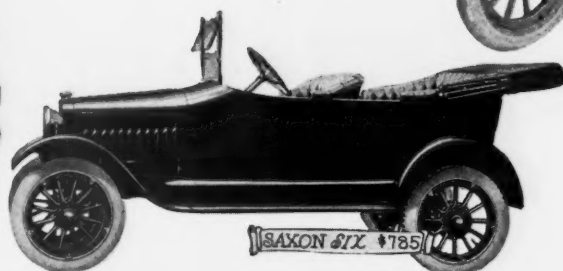
MORSE D \$3600



AUBURN 4-36 \$1075



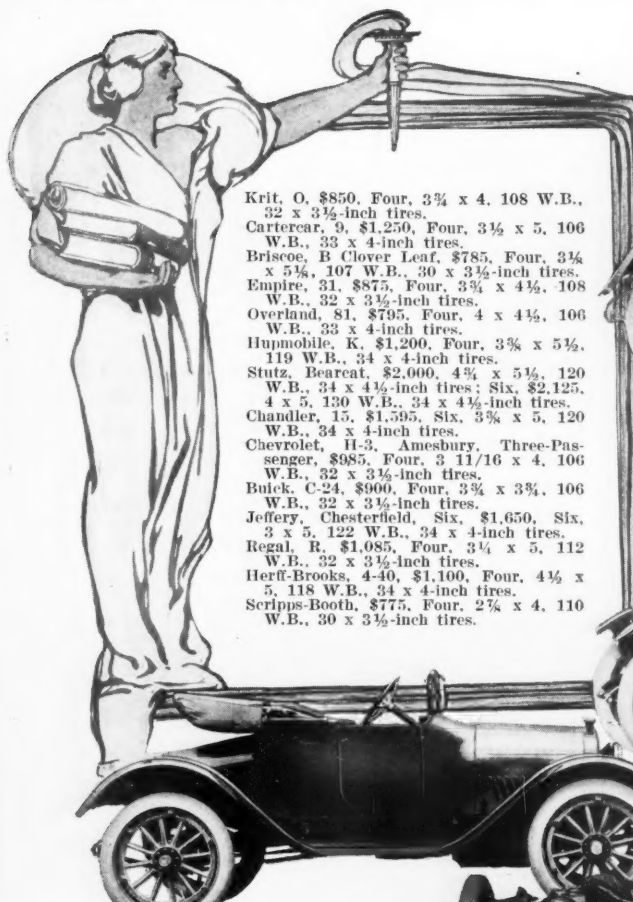
DCH \$900



SAXON SIX \$785



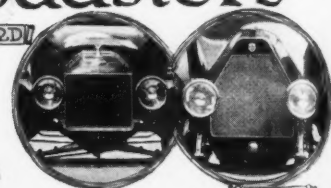
HAYNES



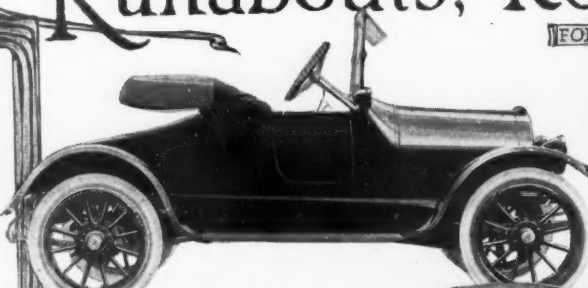
Krit. O. \$850. Four, 3 1/4 x 4. 108 W.B., 32 x 3 1/2-inch tires.
 Cartercar, 9, \$1,250. Four, 3 1/2 x 5. 106 W.B., 33 x 4-inch tires.
 Briscoe, B Clover Leaf, \$785. Four, 3 1/4 x 5 1/2, 107 W.B., 30 x 3 1/2-inch tires.
 Empire, 31, \$875. Four, 3 3/4 x 4 1/2, 108 W.B., 32 x 3 1/2-inch tires.
 Overland, 81, \$795. Four, 4 x 4 1/2, 106 W.B., 33 x 4-inch tires.
 Hupmobile, K, \$1,200. Four, 3 3/4 x 5 1/2, 119 W.B., 34 x 4-inch tires.
 Stutz, Bearcat, \$2,000. 4 3/4 x 5 1/2, 120 W.B., 34 x 4 1/2-inch tires; Six, \$2,125, 4 x 5, 130 W.B., 34 x 4 1/2-inch tires.
 Chandler, 15, \$1,595. Six, 3 3/4 x 5, 120 W.B., 34 x 4-inch tires.
 Chevrolet, H-3, Amesbury, Three-Passenger, \$985. Four, 3 11/16 x 4, 106 W.B., 32 x 3 1/2-inch tires.
 Buick, C-24, \$900. Four, 3 3/4 x 3 3/4, 106 W.B., 32 x 3 1/2-inch tires.
 Jeffery, Chesterfield, Six, \$1,650. Six, 3 x 5, 122 W.B., 34 x 4-inch tires.
 Regal, R, \$1,085. Four, 3 3/4 x 5, 112 W.B., 32 x 3 1/2-inch tires.
 Herff-Brooks, 4-40, \$1,100. Four, 4 1/2 x 5, 118 W.B., 34 x 4-inch tires.
 Scripps-Booth, \$775. Four, 2 3/4 x 4, 110 W.B., 30 x 3 1/2-inch tires.

Runabouts, Roadsters

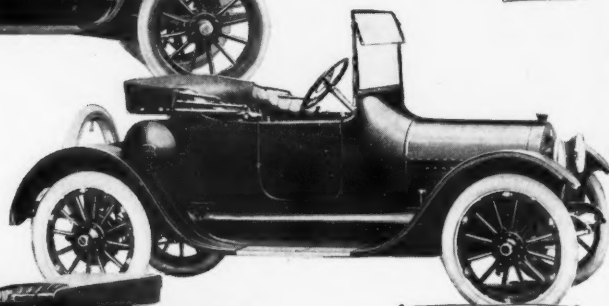
FORD



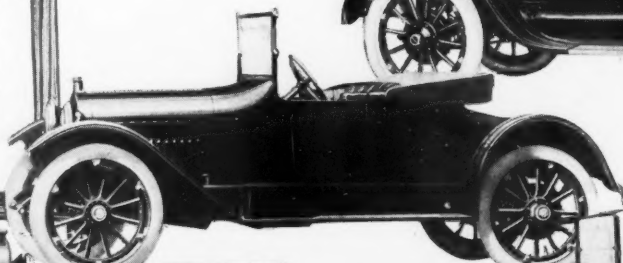
LEWIS



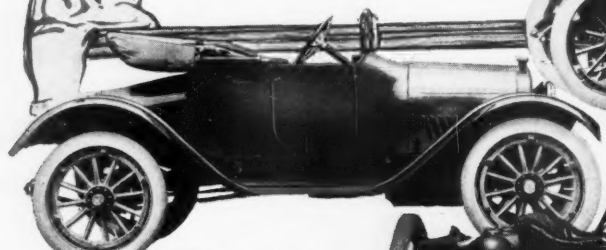
OVERLAND 81 \$795



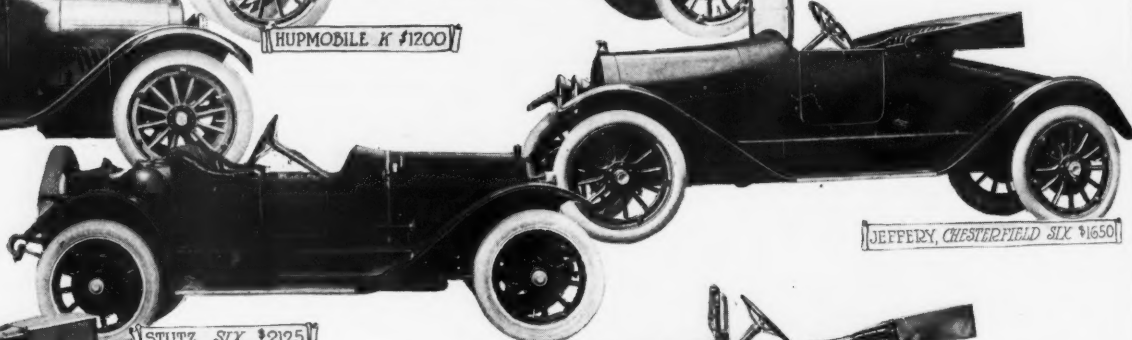
BUICK C-24 \$900



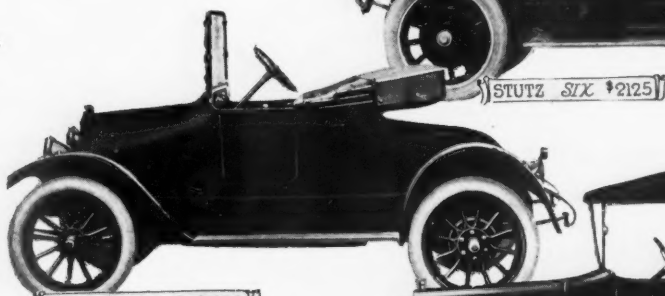
HUPMOBILE K \$1200



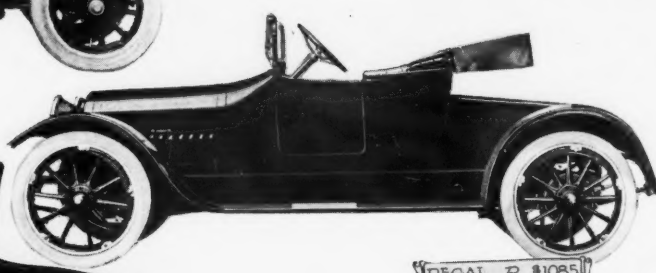
KRIT O \$850



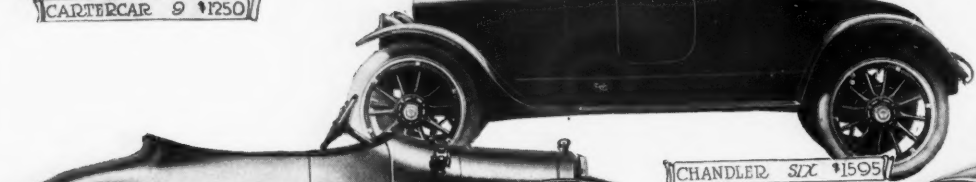
JEFFERY, CHESTERFIELD SIX \$1650



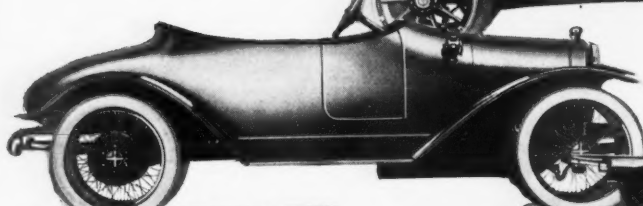
STUTZ SIX \$2125



REGAL R \$1085

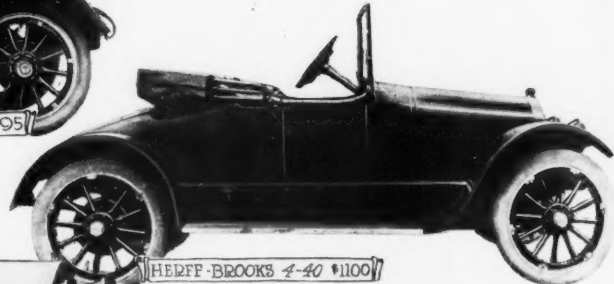


CARTERCAR 9 \$1250

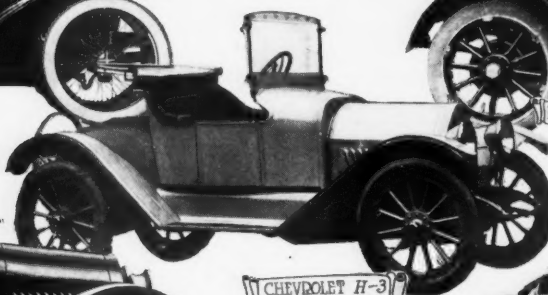


BRISCOE CLOVER LEAF \$785

CHANDLER SIX \$1595



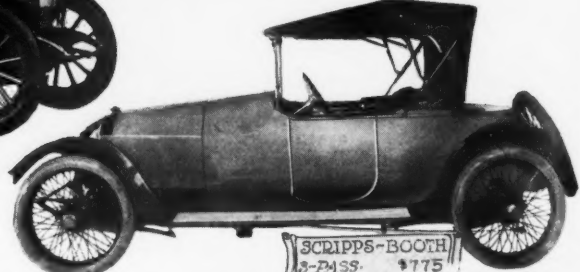
HERFF-BROOKS 4-40 \$1100



CHEVROLET H-3 3-PASS. \$985



EMPIRE 31 \$875



SCRIPPS-BOOTH 3-PASS. \$775

and Speedsters

PAIGE
CHALMERS

BUICK C-36 \$1185

HUDSON SIX 40 \$1550

MAXWELL \$670

PIERCE-ARROW 38 C 5 PASS \$4300

OAKLAND 37 \$1150

STUTZ H.C.S. \$1475

WESCOTT 30 \$1150

KING C \$1075

CHADWICK GREAT SIX \$5500

MOLINE-KNIGHT \$2500

McFARLAN 72 SERIES T \$2590

GRANT M \$425

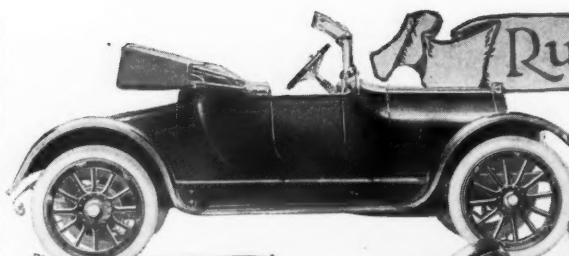
METZ 22 \$495

DAVIS B-3 \$1235

Hudson, 6-40, \$1,550, Six, 3 1/2 x 5, 123 1/2 W.B., 34 x 4-inch tires.
Pierce-Arrow, 38-C-3, \$4,300, Six, 4 x 5 1/2, 134 W.B., 36 x 4 1/2-inch tires.
Stutz, H. C. S., \$1,475, Four, 3 3/4 x 5, 108 W.B., 32 x 4-inch tires.
Moline-Knight, \$2,500, Four, 4 x 6, 128 W.B., 36 x 4 1/2-inch tires.
Grant, M, \$425, Four, 2 3/4 x 4, 90 W.B., 28 x 3-inch tires.
Buick, C-36, \$1,185, Four, 3 3/4 x 5, 112 W.B., 34 x 4-inch tires.
Maxwell, \$670, Four, 3 3/4 x 4 1/2, 102 W.B., 30 x 3 1/2-inch tires.
Westcott, 30, \$1,150, Four, 3 1/2 x 5, 113 W.B., 33 x 4-inch tires.
Chadwick, 19, \$5,500, Six, 5 x 6, 112 W.B., 37 x 5-inch tires.
Metz, 22, \$495, Four, 3 3/4 x 4, 96 W.B., 30 x 3-inch tires.
Oakland, 37, \$1,150, Four, 3 1/2 x 5, 112 W.B., 33 x 4-inch tires.
King, C, \$1,075, Four, 3 15/16 x 5, 113 W.B., 33 x 4-inch tires.
McFarlan, 72, Six, Series T, \$2,590, Six, 4 x 6, 132 W.B., 36 x 4 1/2-inch tires; Series X, \$2,900, Six, 4 1/2 x 6, 132 W.B., 36 x 4 1/2-inch tires.
Davis, B-38, \$1,235, Four, 3 3/4 x 5, 112 W.B., 34 x 4-inch tires.



Runabouts, Roadsters

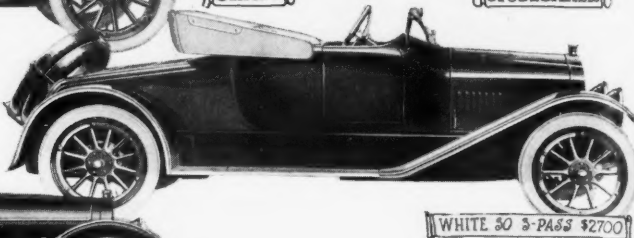


OVERLAND 80 \$1050

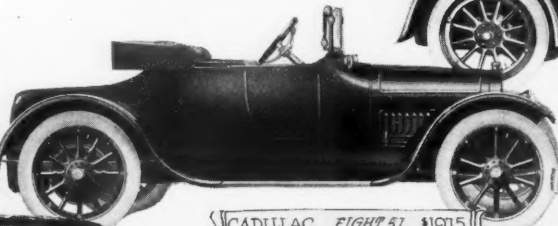


GRANT

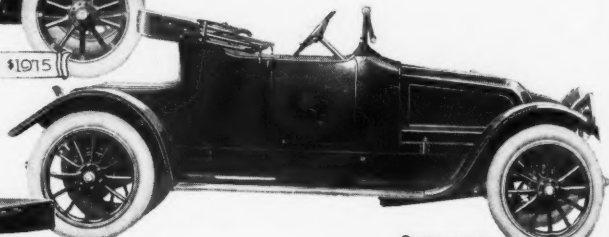
STUDEBAKER



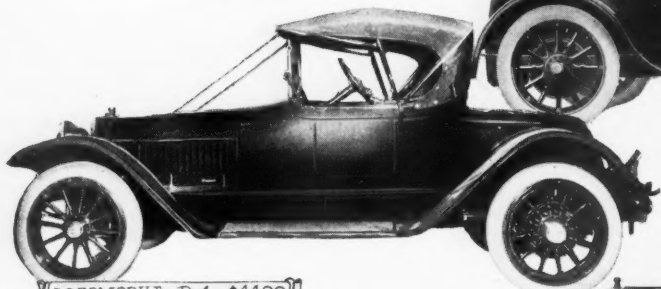
WHITE 30 3-PASS \$2700



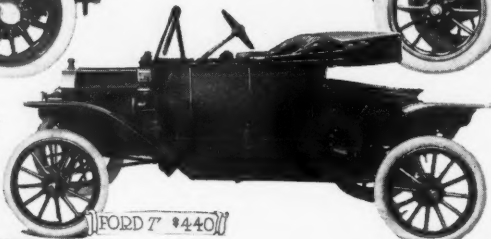
CADILLAC EIGHT 51 \$1915



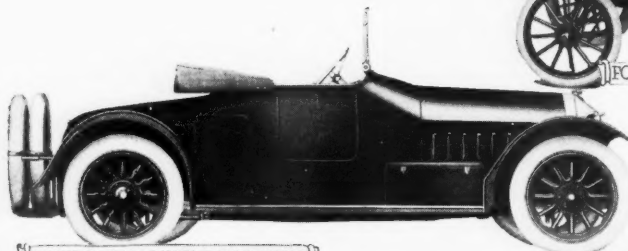
FRANKLIN \$2150



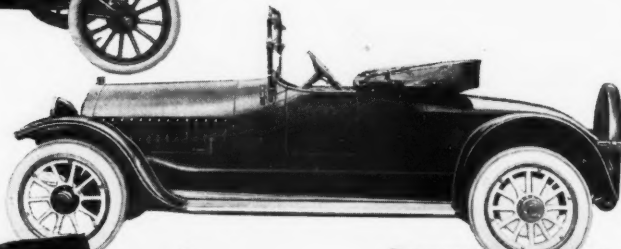
LOCOMOBILE R-4 \$4400



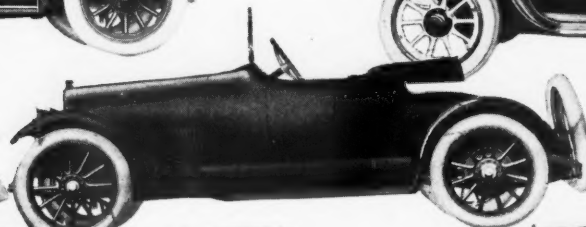
FORD T \$440



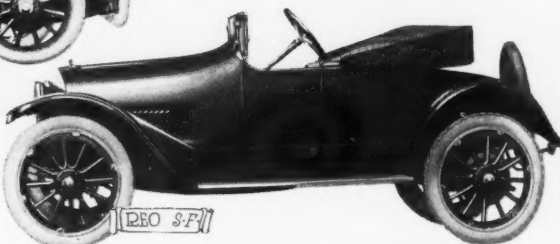
PATHFINDER DANIEL BOONE \$2222



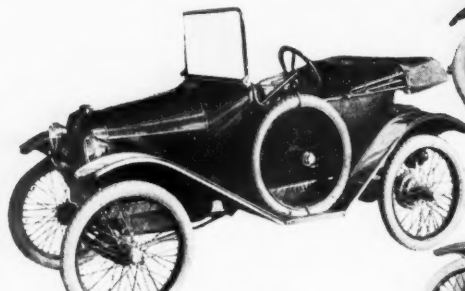
MARMION 41 \$3250



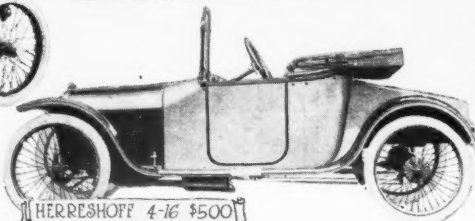
HAYNES 30-SIX \$1485



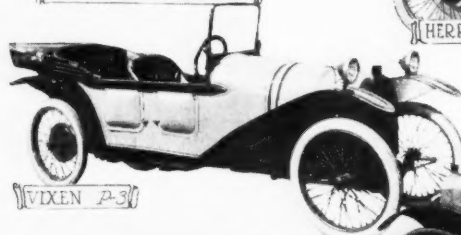
REO S-F



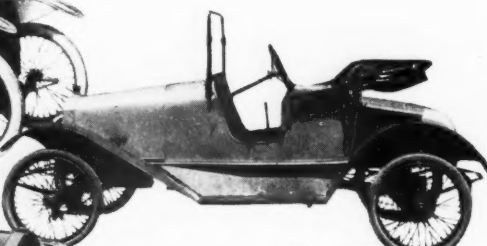
TRUMBULL 15-A \$395



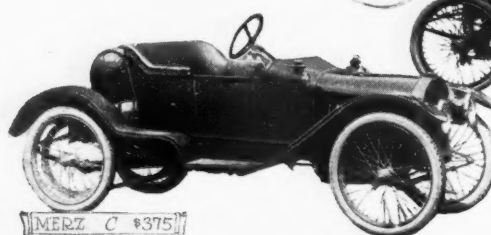
HERRESHOFF 4-16 \$500



VIXEN P-3



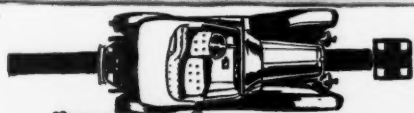
VARGO A \$295



MERZ C \$375

Locomobile, R-4, \$4,400, Six, 4 1/4 x 5, 132 W.B., 37 x 5-inch tires.
 Pathfinder, Daniel Boone, \$2,222, Six, 3 3/4 x 5 1/4, 125 W.B., 34 x 4 1/2-inch tires.
 Trumbull, 15-A, \$395, Four, 2 3/4 x 4, 80 W.B., 28 x 3-inch tires.
 Vixen, P-3, \$395, Four, 2 3/4 x 4, 106 W.B., 28 x 3-inch tires.
 Merz, C, \$375.
 Overland, 80, \$1,050, Four, 4 1/4 x 4 1/4, 114 W.B., 34 x 4-inch tires.
 Cadillac, Eight, \$1,975, Eight, 3 3/4 x 5 1/4, 122 W.B., 36 x 4 1/2-inch tires.
 Haynes, 30, \$1,485, Six, 3 1/4 x 5, 121 W.B., 34 x 4-inch tires.
 Herreshoff, 4-16, \$500, Four, 2 3/4 x 3 1/4, 94 W.B., 28 x 3-inch tires.
 Ford, T, \$440, Four, 3 3/4 x 4, 100 W.B., 30 x 3 1/2-inch tires.
 Argo, A, \$295, Four, 2 5/16 x 4, 90 W.B., 28 x 2 1/4-inch tires.
 White, 30, Three-Passenger Roadster, \$2,700, Four, 3 3/4 x 5 1/4, 115 W.B., 32 x 4 tires.
 Franklin, \$2,150, Six 3 3/4 x 4, 120 W.B.
 Marmion, 41, \$3,250, Six, 4 1/4 x 5 1/4, 132 1/2.
 Reo, S. T., Four, \$1,575, 4 1/4 x 4 1/4, 112 W.B.

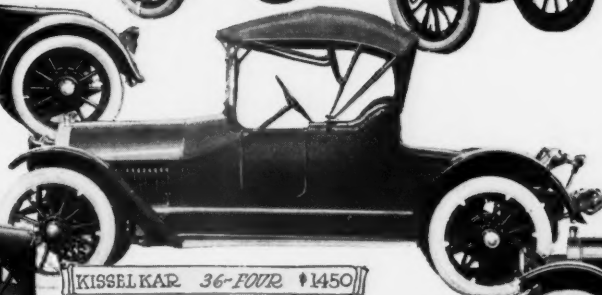
and Speedsters Continued



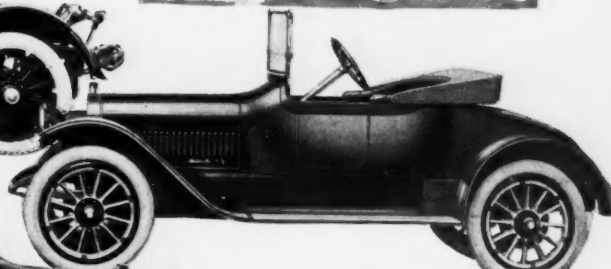
CHANDLER

STUDEBAKER FOUR
3 PASS. \$985

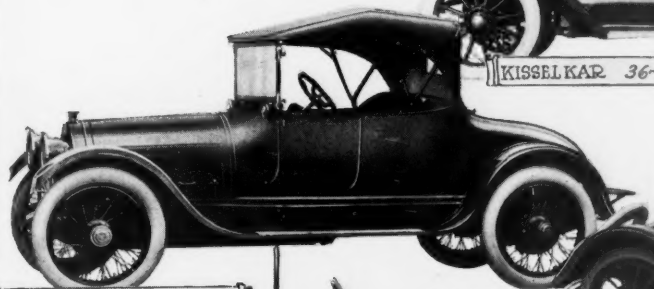
CHALMERS COUPELET 26B \$1900



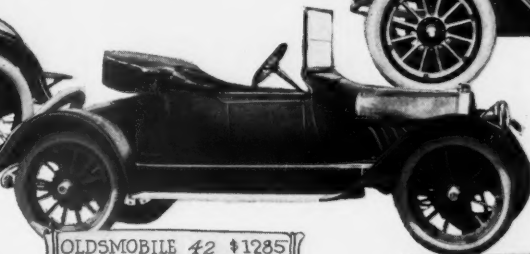
KISSELKAR 36-FOUR \$1450



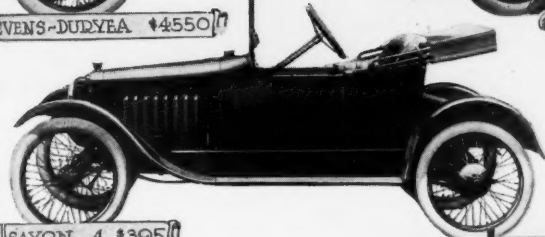
WINTON F-1 \$3250



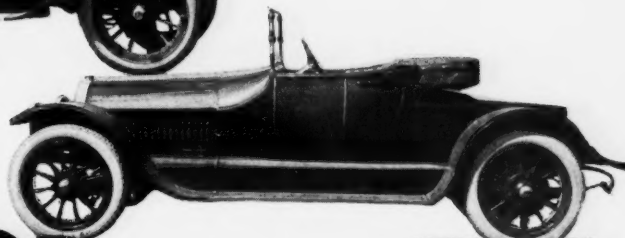
STEVENS-DURYEA \$4550



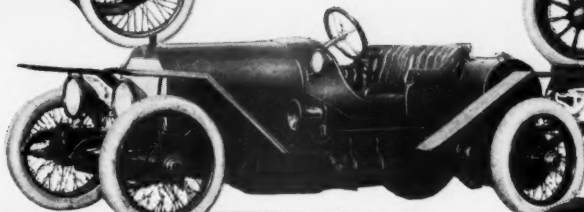
OLDSMOBILE 42 \$1285



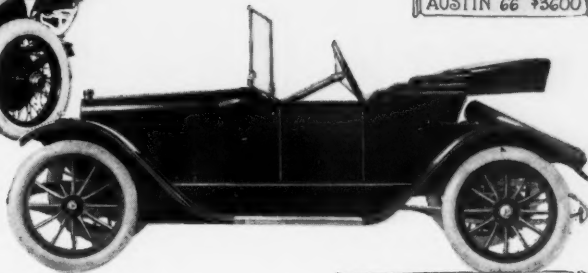
SAXON A \$395



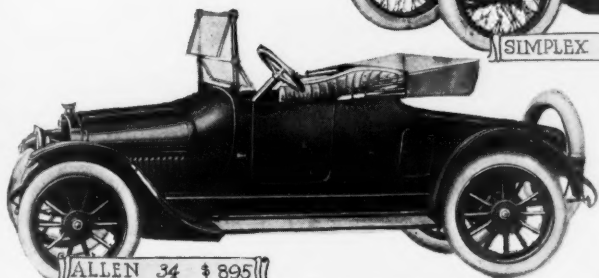
AUSTIN 66 \$3600



SIMPLEX SERIES F \$6900

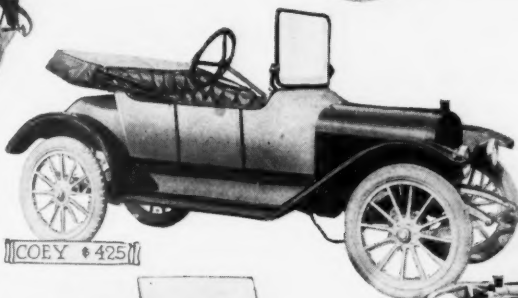


PARTIN-PALMER 20 \$495

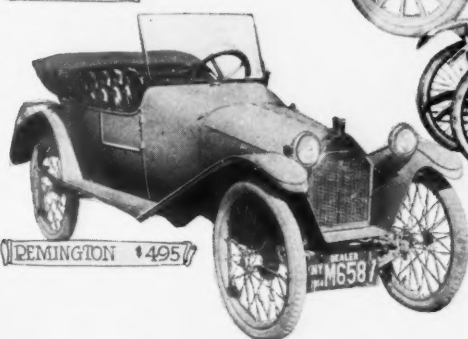


ALLEN 34 \$895

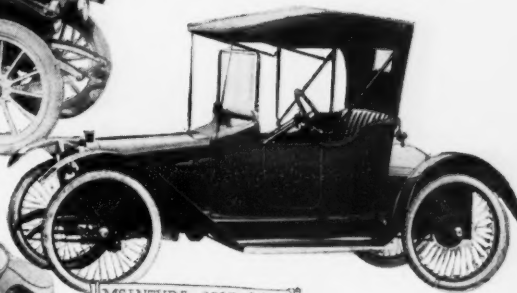
Chalmers, 26B. Coupelet, \$1,900. Six, 3 1/2 x 5 1/2. 125 W.B., 34 x 4 1/2-inch tires.
 Stevens-Duryea, Disappearing Top, \$4,550. Six, 4 3/4 x 5 1/2. 131 W.B., 37 x 4 1/2-inch tires.
 Saxon, A, \$395. Four, 2 3/4 x 4. 96 W.B., 28 x 3-inch tires.
 Allen, 34, \$895. Four, 3 3/4 x 5. 110 W.B., 32 x 3 1/2-inch tires.
 Studebaker, Four, Three-Passenger, \$985. Four, 3 1/2 x 5. 108 W.B., 33 x 4-inch tires.
 Kisselkar, 36-4, \$1,450. Four, 4 1/4 x 5 1/2. 121 W.B., 34 x 4-inch tires.
 Oldsmobile, 42, \$1,285. Four, 3 1/2 x 5. 112 W.B., 33 x 4-inch tires.
 Simplex, Model F, \$6,900. Six, 3 3/4 x 5 1/2. 130 W.B., 35 x 4 1/2-inch tires.
 Coey, Four, \$425. Four 2 3/4 x 4 1/2. 96 W.B., 28 x 3-inch tires.
 McIntyre, 1915, \$490.
 Remington, \$495. Four, 2 3/4 x 4. 100 W.B., 28 x 3-inch tires.
 Winton, F-1, \$3,250. Six, 4 1/2 x 5 1/2. 130 W.B., 37 x 5-inch tires.
 Austin, 66, \$3,600. Six, 4 1/4 x 6. 141 W.B., 34 x 4 1/2-inch tires.
 Partin-Palmer, 20, \$495. Four, 3 3/4 x 4. 96 W.B., 28 x 3-inch tires.



COEY \$425

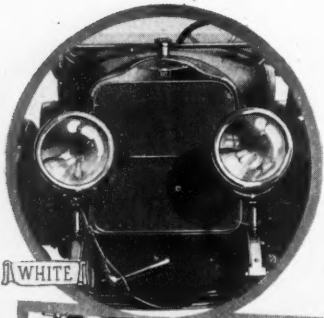


REMINGTON \$495

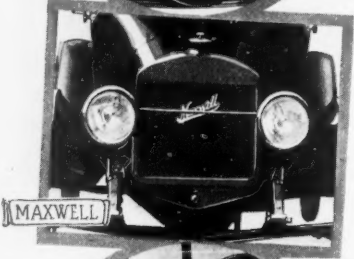


MCINTYRE 1915 \$490

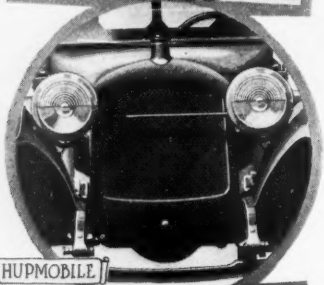
Touring Cars



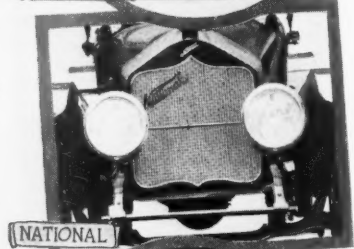
WHITE



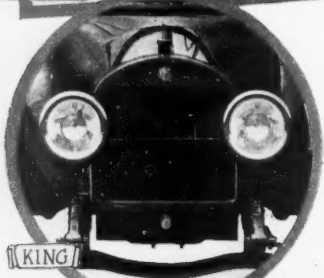
MAXWELL



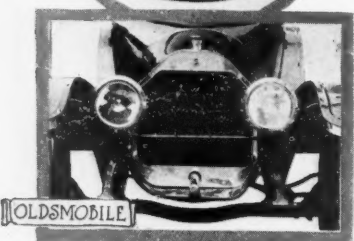
HUPMOBILE



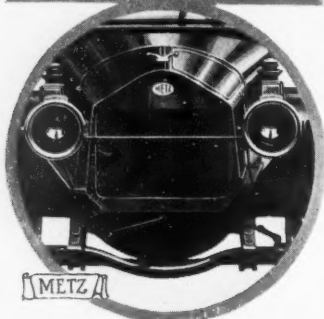
NATIONAL



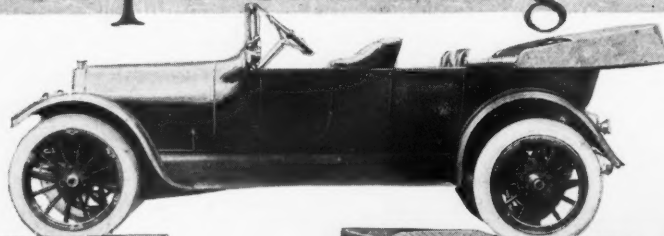
KING



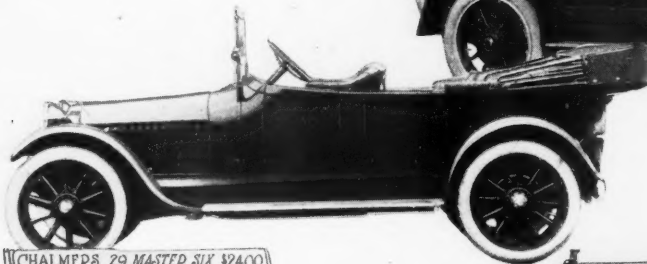
OLDSMOBILE



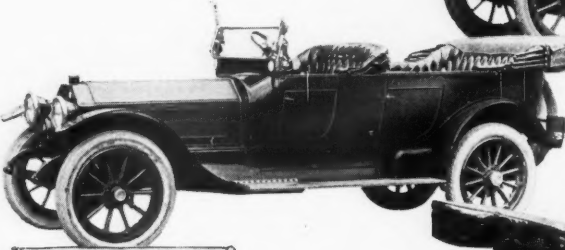
METZ



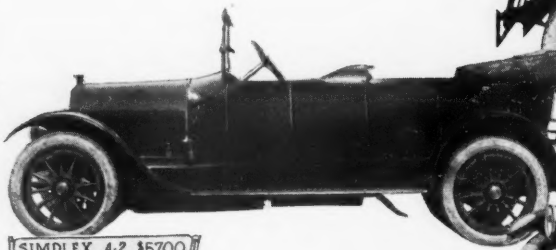
OVERLAND SIX \$1475



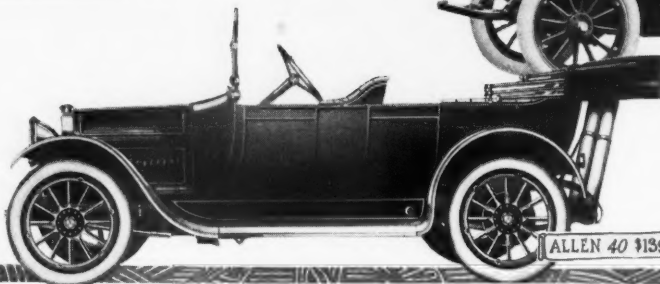
CHALMERS 29 MASTER SIX \$2400



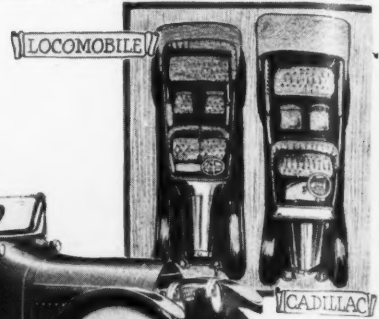
PEERLESS 48-SIX \$5000



SIMPLEX A-2 \$5700

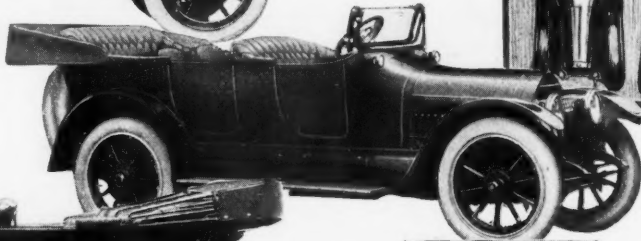


ALLEN 40 \$1395

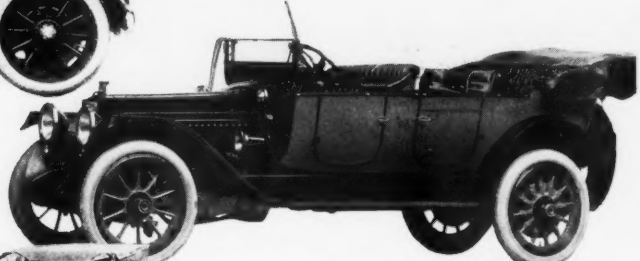


LOCOMOBILE

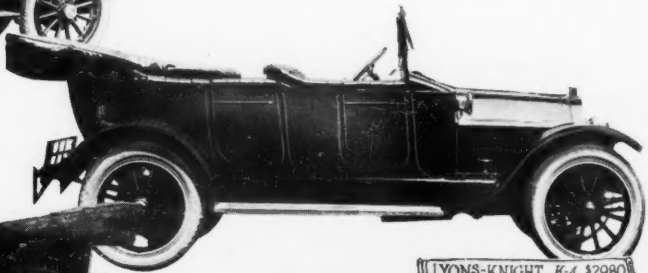
CADILLAC



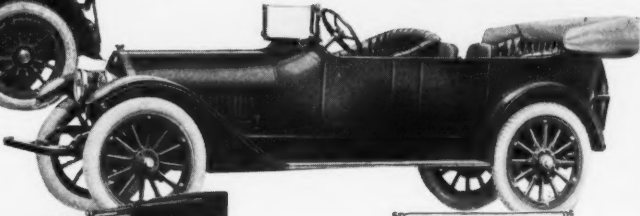
CADILLAC EIGHT \$1975



PACKARD 3-38 \$3850



LYONS-KNIGHT K-4 \$2980

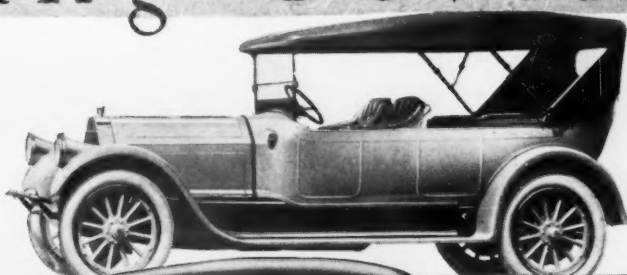


PRATT 6-50 \$2250

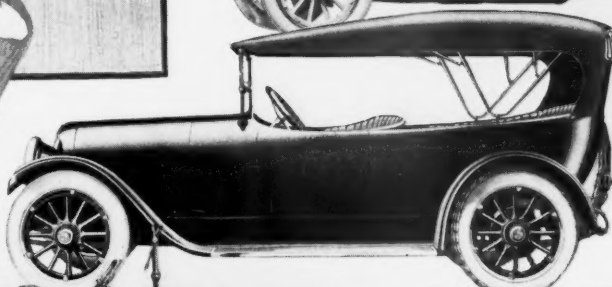
Overland, 82, \$1,475, Six, 3 1/2 x 5 1/4, 125 W.B., 35 x 4 1/2-inch tires.
 Chalmers Master, Six, \$2,400, Six, 3 1/2 x 5 1/4, 125 1/2 W.B., 34 x 4 1/2-inch tires.
 Peerless, 48-Six, 4 1/2 x 6, 137 W.B., 37 x 5-inch tires.
 Simplex, A-2-38 H.P., \$5,700, Four, 4 3/4 x 6 1/4, 137 W.B., 35 x 5-inch tires.
 Allen, 40, \$1,395, Four, 4 3/4 x 5, 118 W.B., 35 x 4 1/2-inch tires.

Cadillac, Eight, \$1,975, Eight, 3 1/2 x 5 1/4, 122 W.B., 36 x 4 1/2-inch tires.
 Packard, 3-38, \$3,850, Six, 4 x 5 1/2, 140 W.B., 37 x 5-inch tires.
 Lyons-Knight, K-4, \$2,980, Four, 4 1/2 x 5 1/2, 130 W.B., 37 x 5-inch tires.
 Pratt, 6-50, \$2,250, Six, 3 3/4 x 5 1/4, 132 W.B., 37 x 4 1/2-inch tires.

Seating Seven



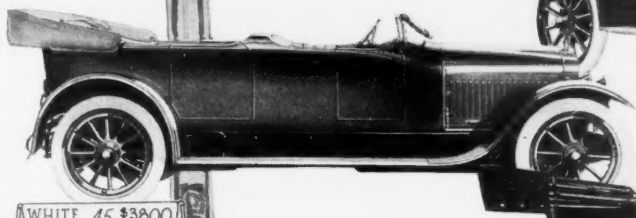
PIERCE-ARROW 66-A-3 \$6000



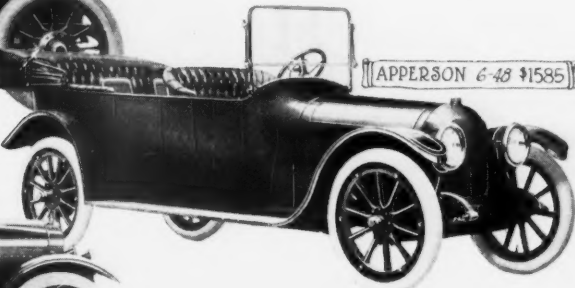
PAIGE SIX 46 \$1395



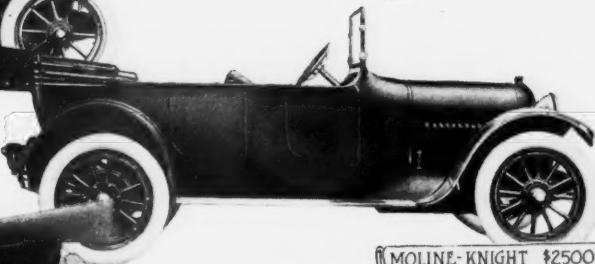
OAKLAND 6-49 \$1685



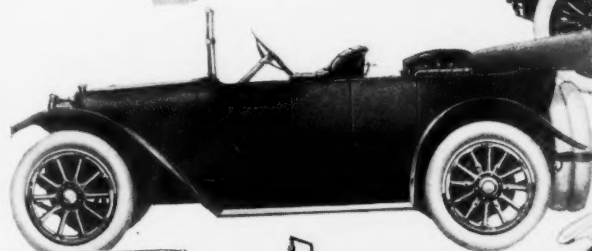
WHITE 45 \$2800



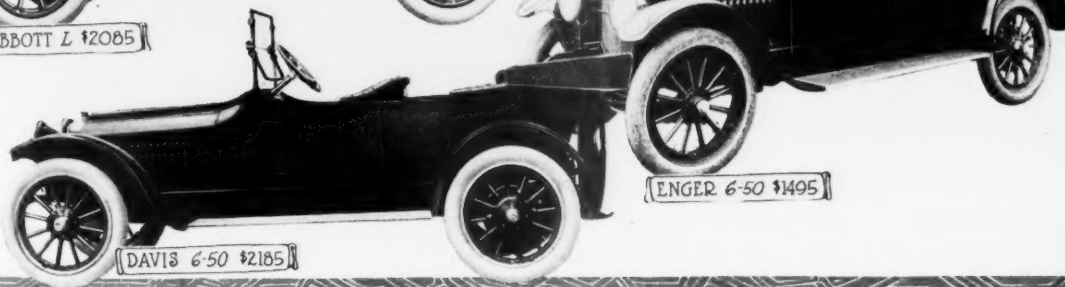
APPERSON 6-48 \$1585



MOLINE-KNIGHT \$2500



ABBOTT L \$2085

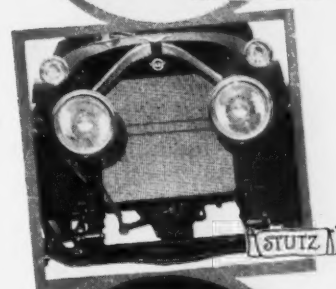


DAVIS 6-50 \$2185

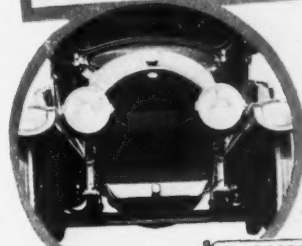
ENGER 6-50 \$1495



OVERLAND



STUTZ



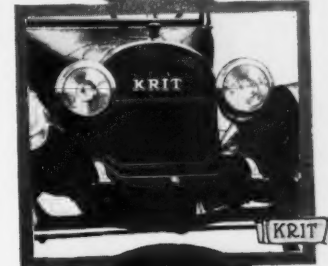
MARMON



STEARNS



KISSELKAR



KRIT



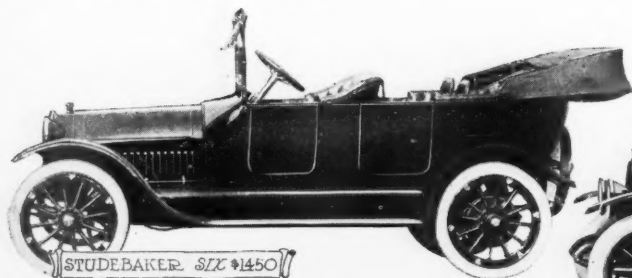
GLIDE

Oakland, 6-49, \$1,685, Six, 3 1/2 x 5, 123 1/2 W.B., 35 x 4 1/2-inch tires.
 White, 45, \$3,800, Four, 4 1/4 x 6 1/2, 132 1/2 W.B., 34 x 4-inch tires.
 Abbott L, \$2,085, Four, 4 1/2 x 5 1/2, 121 W.B., 36 x 4 1/2-inch tires.
 Davis, Six-50, \$2,185, Six, 3 3/4 x 5 1/4, 128 W.B., 37 x 4 1/2-inch tires.

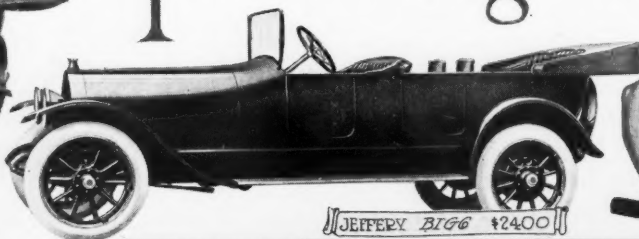
Pierce-Arrow, 66-A-3, \$6,000, Six, 5 x 7, 147 1/2 W.B., 38 x 5 1/2-inch tires.

Paige, Six-46, \$1,395, Six, 3 1/2 x 5 1/4, 124 W.B., 34 x 4-inch tires.
 Apperson, 6-48, \$1,585, Six, 3 1/2 x 5 1/4, 126 W.B., 34 x 4-inch tires.
 Moline-Knight, \$2,500, Four, 4 x 6, 128 W.B., 36 x 4 1/2-inch tires.
 Enger, 6-50, \$1,495, Six, 3 1/2 x 5, 125 W.B., 34 x 4-inch tires.

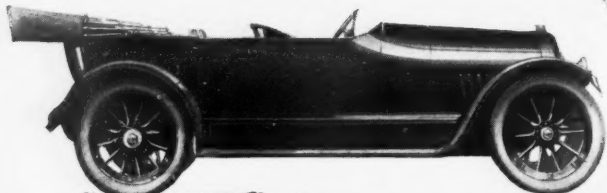
Touring Cars



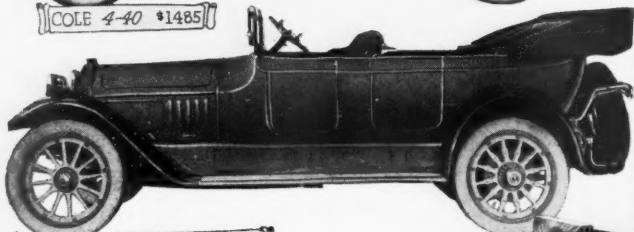
STUDEBAKER SIX \$1450



JEFFERY BIG 6 \$2400



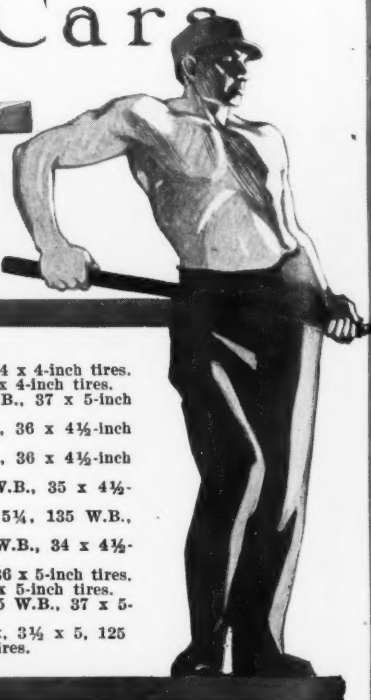
COLE 4-40 \$1485



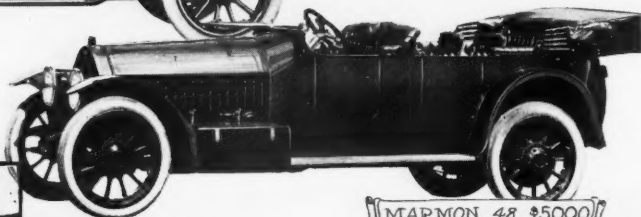
LOCOMOBILE JZ 48 \$5100

Studebaker, Six, \$1,450, Six, 3 1/2 x 5, 121 W.B., 34 x 4-inch tires.
 Cole, 440, \$1,485, Four, 4 1/4 x 5 1/4, 118 W.B., 34 x 4-inch tires.
 Locomobile, 6-48, \$5,100, Six, 4 1/2 x 5 1/2, 140 W.B., 37 x 5-inch tires.
 National, A A, \$2,500, Six, 3 3/4 x 5 1/2, 132 W.B., 36 x 4 1/2-inch tires.
 Imperial, 6-56, \$2,200, Six, 3 3/4 x 5 1/4, 130 W.B., 36 x 4 1/2-inch tires.
 Klinekar, 6-42 A, \$1,850, Six, 3 1/2 x 5 1/4, 127 W.B., 35 x 4 1/2-inch tires.
 Pathfinder, Leather Stocking, \$2,750, Six, 4 1/4 x 5 1/4, 135 W.B., 35 x 5-inch tires.
 Jeffery, Big Six, \$2,400, Six, 3 3/4 x 5 1/4, 133 1/2 W.B., 34 x 4 1/2-inch tires.
 Oldsmobile, 55, \$2,975, Six, 4 1/2 x 5 1/4, 139 W.B., 36 x 5-inch tires.
 Marmon, 48, \$5,000, Six, 4 1/2 x 6, 145 W.B., 37 x 5-inch tires.
 Speedwell Rotary Six, \$2,590, Six, 4 1/4 x 5 1/4, 135 W.B., 37 x 5-inch tires.

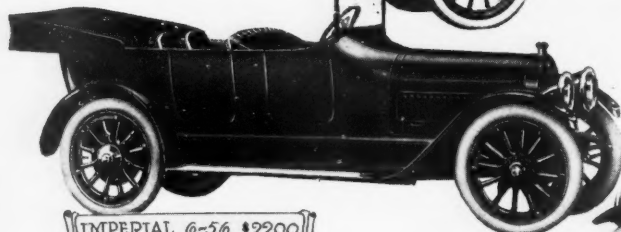
Monarch, \$1,250, Six, 3 1/2 x 5, 125 W.B., 33 x 4-inch tires.



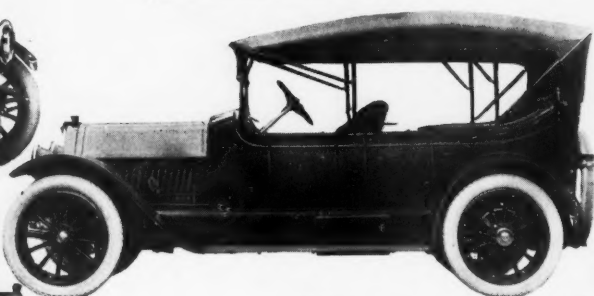
NATIONAL AA \$2500



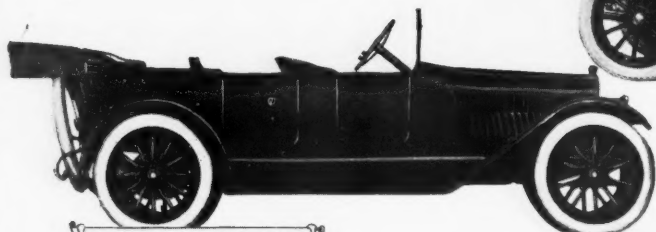
MARMON 48 \$5000



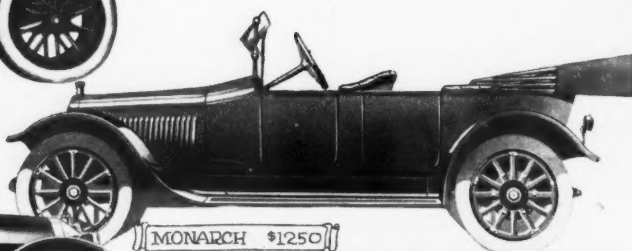
IMPERIAL 6-56 \$2200



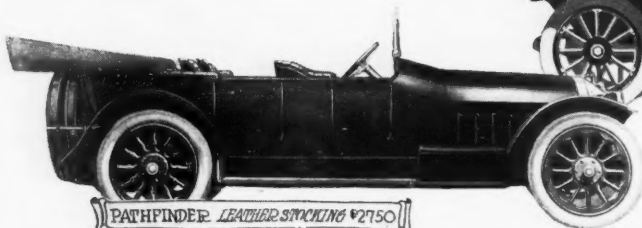
SPEEDWELL ROTARY SIX \$2590



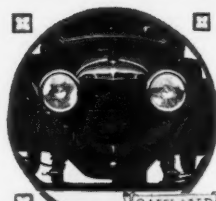
KLINE KAR 6-42A \$1850



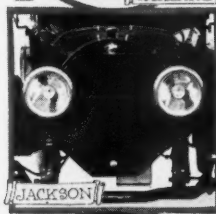
MONARCH \$1250



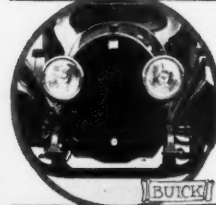
PATHFINDER LEATHER STOCKING \$2750



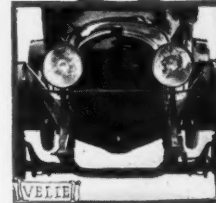
OAKLAND



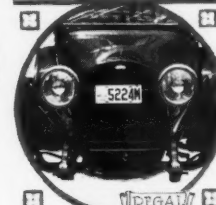
JACKSON



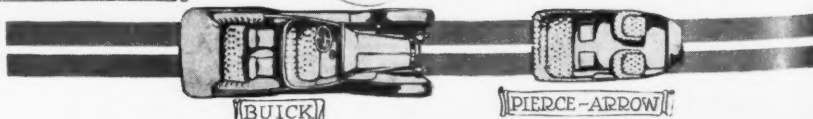
BUICK



VELIE



REGAL

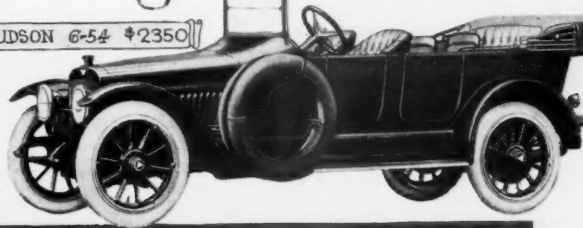


BUICK

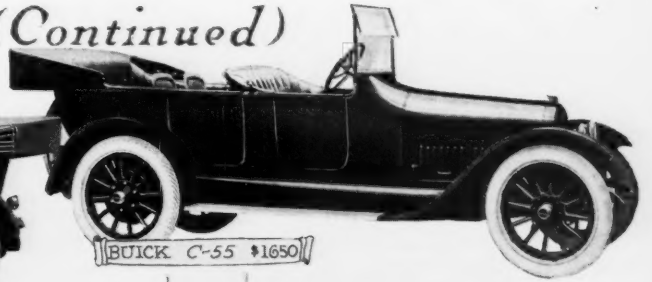
PIERCE-ARROW

Seating Seven (Continued)

HUDSON 6-54 \$2350



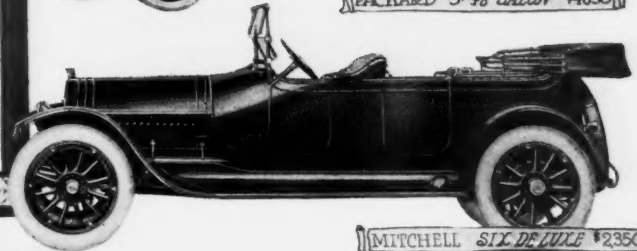
BUICK C-55 \$1650



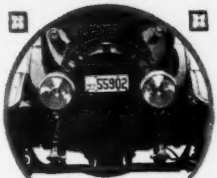
Hudson, 6-54, \$2,350, Six, 4 1/4 x 5 1/4, 135 W.B., 36 x 4 1/2-inch tires.
 Stevens-Duryea, DD 6, \$4,800, Six, 4 7/16 x 5 1/4, 138 W.B., 37 x 5-inch tires.
 Cunningham, Touring, \$3,750, Four, 4 1/4 x 5 1/4, 129 W.B., 37 x 5-inch tires.
 Republic, E., \$2,950, Six, 4 1/4 x 5, 133 W.B., 36 x 4 1/2 tires.
 Paterson, 6-48, \$1,495, Six, 3 1/2 x 5, 124 W.B., 34 x 4 tires.
 Buick, C-55, \$1,650, Six, 3 3/4 x 5, 130 W.B., 36 x 4 1/2 tires.
 Packard, 5-48, Salon Touring, \$4,850, Six, 4 1/4 x 5 1/4, 144 W.B., 37 x 5-inch tires.
 Mitchell, Six DeLuxe, \$2,350, Six, 4 1/4 x 7, 144 W.B., 37 x 5-inch tires.
 Fiat, 6-50, \$5,150, Six, 4 1/4 x 5 1/4, 135 W.B., 37 x 5 tires.
 Chadwick, 19, \$5,500, Six, 5 x 6, 133 W.B., 37 x 5 tires.
 Touraine, Touring, \$3,250, Six, 4 x 5 1/4, 134 W.B., 34 x 4 1/4-inch tires.
 Pilot, Light Six, \$1,885, Six, 3 1/2 x 5 1/4, 125 W.B., 34 x 4-inch tires.



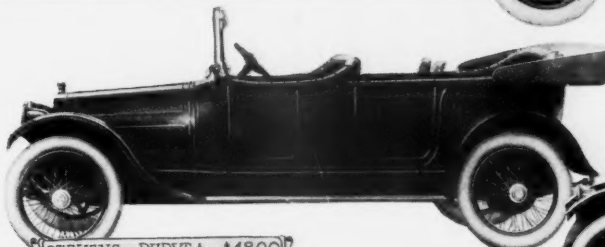
PACKARD 5-48 SALON \$4850



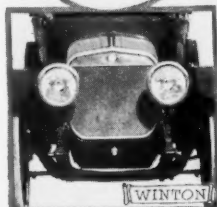
MITCHELL SIX DE LUXE \$2350



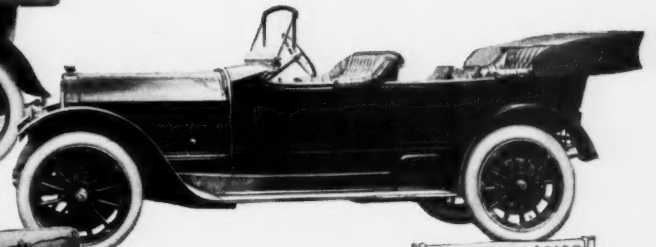
CADILLAC



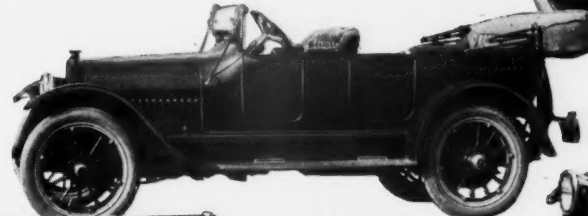
STEVENS-DURYEA \$4800



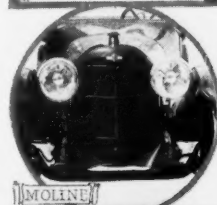
WINTON



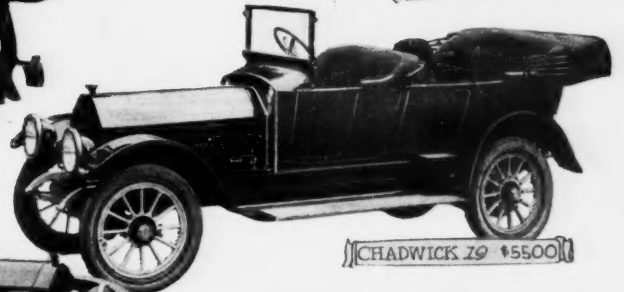
FIAT 6-50 \$5150



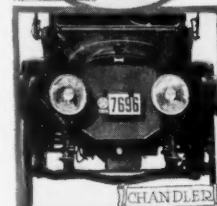
CUNNINGHAM \$3750



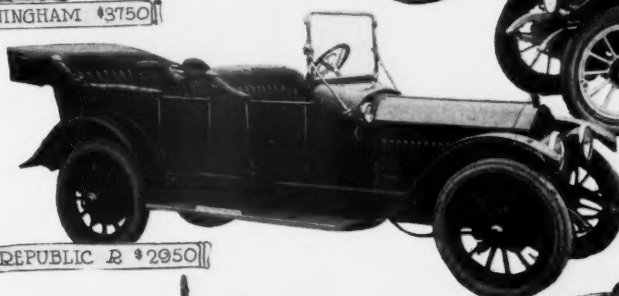
MOLINE



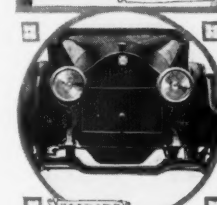
CHADWICK 19 \$5500



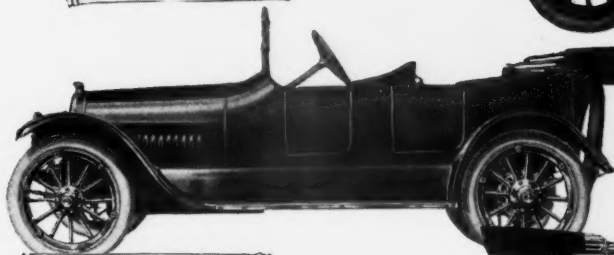
CHANDLER



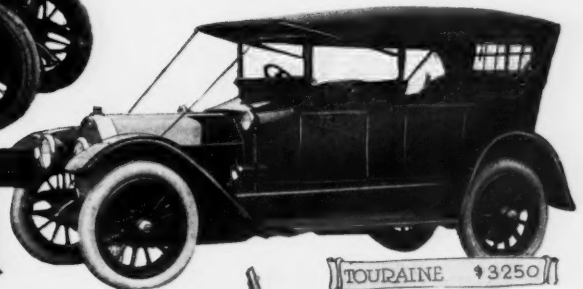
REPUBLIC R \$2950



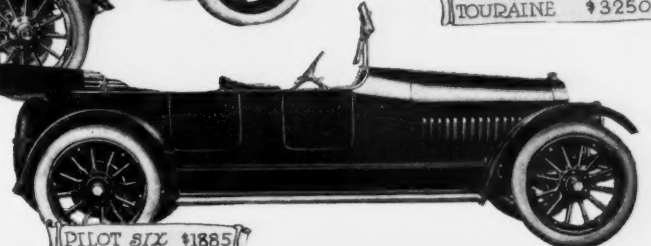
EMPIRE



PATERSON 6-48 \$1495



TOURAINÉ \$3250



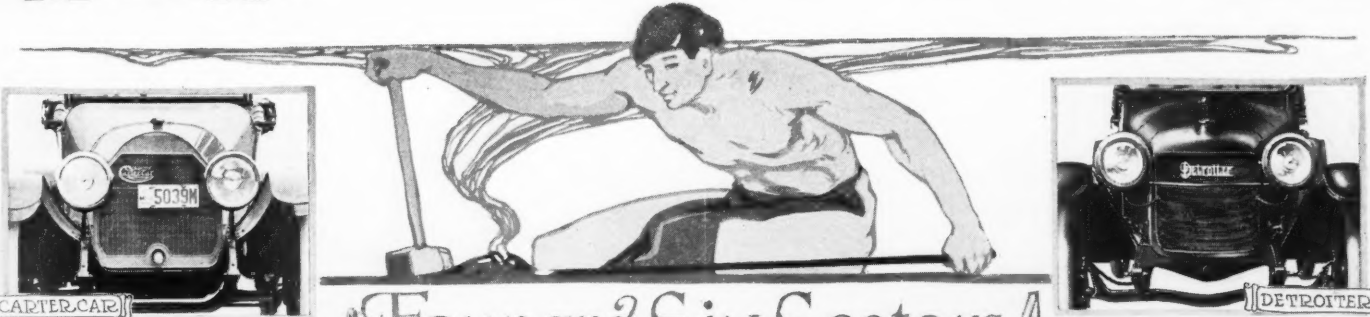
PILOT SIX \$1885



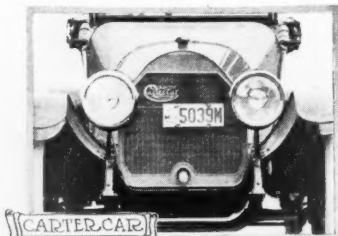
COLE



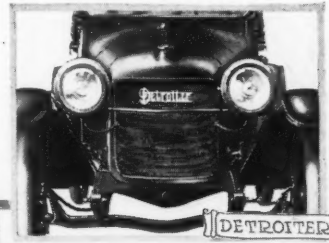
PATHFINDER



Four and Six-Seaters



CARTER CAR



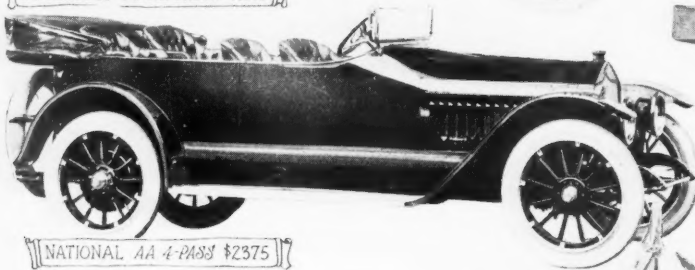
DETROIT



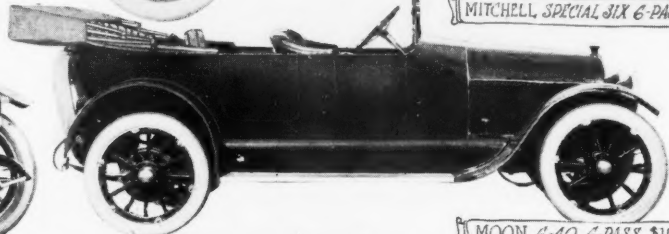
CADILLAC 51 4-PASS SALON \$1975



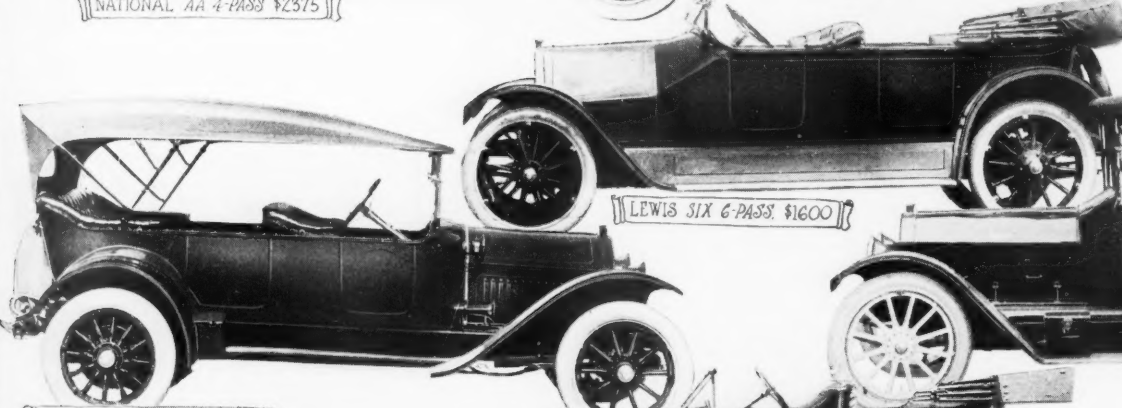
MITCHELL SPECIAL SIX 6-PASS \$1995



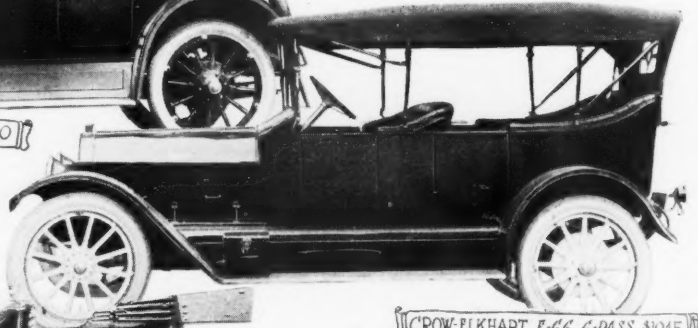
NATIONAL AA 4-PASS \$2375



MOON 6-40 6-PASS \$1575

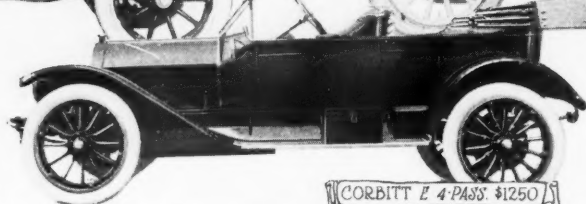


LEWIS SIX 6-PASS \$1600

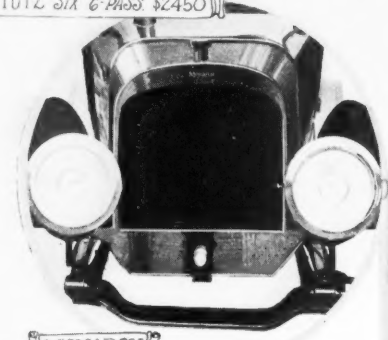


CROW-ELKHART E-66 6-PASS \$1945

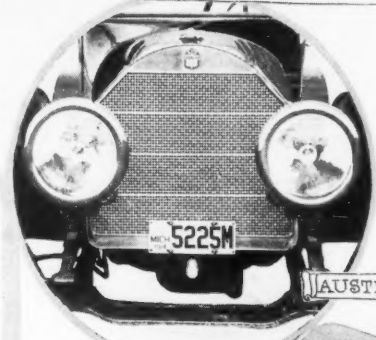
STUTZ SIX 6-PASS \$2450



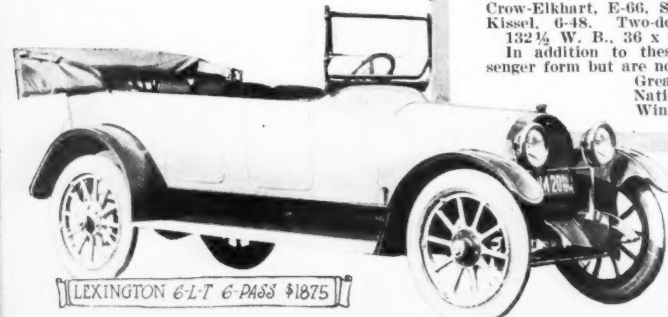
CORBITT E 4-PASS \$1250



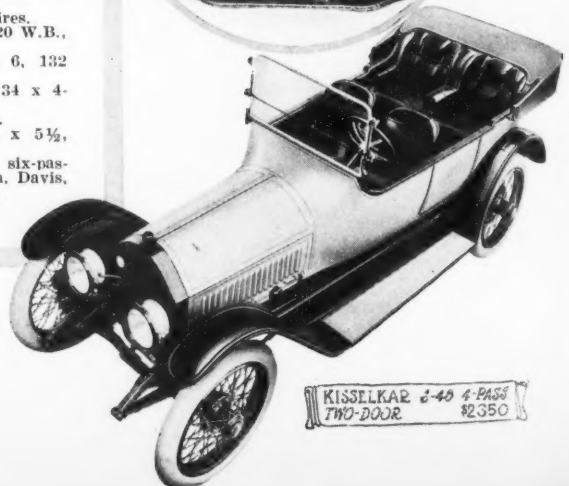
MONARCH



AUSTIN



LEXINGTON 6-L-T 6-PASS \$1875



KISSELKAR 6-40 4-PASS TWO-DOOR \$2350

Cadillac, 51 Salon, Eight, 3 1/4 x 5 1/4, Four-passenger, \$1,975, 122 W.B., 36 x 4 1/2-inch tires.
 National, A. A., Six, 3 1/4 x 5 1/4, Four-passenger, \$2,375, 132 W.B., 36 x 4 1/2-inch tires.
 Stutz, Touring, Six-passenger, Four, 4 1/4 x 5 1/4, \$2,275, Six, 4 x 5, \$2,450, 130 W.B., 34 x 4 1/2-inch tires.
 Lexington, 6-L-T, 3 1/2 x 5, Six-passenger, \$1,875, 128 W.B., 34 x 4-inch tires.
 Lewis, Six, Six-passenger, \$1,000, 135 W.B., 36 x 4-inch tires.
 Corbitt, Model E, Four, 4 x 4 1/2, Four-passenger, \$1,250, 120 W.B., 34 x 4-inch tires.
 Mitchell, Special Six, Six-passenger, \$1,995, Six, 4 1/4 x 6, 132 W.B., 36 x 4-inch tires.
 Moon, 6-40, 3 1/2 x 5, Six-passenger, \$1,575, 122 W.B., 34 x 4-inch tires.
 Crow-Elkhart, E-66, Six-passenger, \$1,945, 3 3/4 x 5 1/4, 130.
 Kissel, 6-48, Two-door, Four-passenger, \$2,350, Six, 4 x 5 1/4, 132 1/2 W. B., 36 x 4 1/2-inch tires.

In addition to these, the following cars are made in six-passenger form but are not illustrated as such: Auburn, Austin, Davis, Great Western, Locomobile, McFarlan, National, Packard, Stearns-Knight, Velle, Winton.

Explanation of the Terms Used in the Specification Tables

S. A. E. H. P.—Various formulas have been used for the horsepower rating of gas engines, but in these tables the horsepower is calculated from the formula adopted by the Society of Automobile Engineering, $D^2N \div 2.5$. D^2 is the square of the piston diameter or bore in inches and N is the number of cylinders. The denominator is the constant that the engineers have concluded to be practical.

Piston Displacement—The space the piston sweeps through in the cylinder during the stroke is known as the piston displacement. In Fig. 1, B is the top dead center and C the top of the piston at the lower end of the stroke. A is the piston displacement. The volume of A is found by multiplying the square of the bore in inches by .7854 and this result by the stroke in inches.

Cylinder Shapes—The expressions, T-head, L-head and I-head, refer to cylinders whose shape resembles the letters, T, L, and I.

The T-head has the intake valves on one side and the exhaust on the other. The L-head has all the valves on one side. The I-head has the valves in the head. There is a form of L-head which has one set of valves in the head and the other in the side, as shown at the extreme right of the illustration in Fig. 4.

Camshaft Drive—Spur, chain and helical are mentioned. When spur is stated, a plain spur gear drives the camshaft. Helical camshaft drive means a helically cut gear drives the shaft. The chain drive is a silent chain operating the timing gears.

Cooling Systems—Thermo in the tables means thermo-siphon or natural cooling, the system requiring no pump. Advantage is taken in this system of the fact, hot water rises to the top and so makes its way to the radiator where it is cooled. In pump cooling usually a centrifugal pump forces water through the cylinder jackets.

Lubricating Systems—The tables show only splash, splash-pressure and straight pressure. In the first class are two divisions circulating and non-circulating. In the former the oil is taken by a pump from the crankcase and forced to a distributing channel from which it falls to troughs under the connecting rods. The overflow drops to the crankcase where it is again picked up by the pump. In the non-circulating splash the oil never is recirculated. In this class is the vacuum feed. The splash-pressure uses leads to the bearings and also troughs under the rods for splash. The pressure uses no splash, all the feed being by leads to the various parts requiring oil.

Types of Lubricating Pump—Centrifugal pumps consist of a wheel with a hollow hub and holes between the long curved blades. As the wheel revolves the oil fed to the hub is pushed through the holes and forced upward by the teeth. The piston or plunger pump operates on the same principle as the tire pump. In a few cases wheel pumps are mentioned and these consist of a paddle wheel or flywheel revolving in the oil reservoir. Gear pumps are two-spur gears in mesh whose teeth carry the oil through.

Ignition System—The single system consists of one source of current and one set of spark plugs. The dual system consists of two sources of current, usually a battery and magneto and one set of plugs. The double system consists of a battery and magneto and two sets of plugs, with only one set sparking during motor operation. Two-point ignition requires the use of double-distributor magneto and two sets of plugs. In this case both sets of plugs operate at once.

Control—Fixed control is one in which the spark is fixed so that it will occur at a given point in the cycle and cannot be changed without removing the magneto and retiming it. On the other hand, the automatic control is one in which the spark automatically advances with motor speed. The hand control is familiar to all, it being the

type in which a spark lever is used to vary the time of spark occurrence.

Fuel Feed—Three systems are given, pressure, gravity and vacuum. The pressure uses a rear tank and the fuel is forced by air pressure to the carburetor. The gravity uses either a cowl tank or a container under the front seat and the feed is a natural one, by gravity, to the carburetor. In the vacuum feed an auxiliary tank is connected to the inlet manifold, to the rear tank and to the carburetor. The motor suction creates a vacuum in the auxiliary tank which allows fuel from the rear to rush into the auxiliary

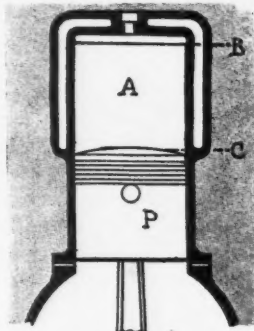


Fig. 1—Illustrating the meaning of piston displacement. It refers to the space A swept by the piston during its stroke

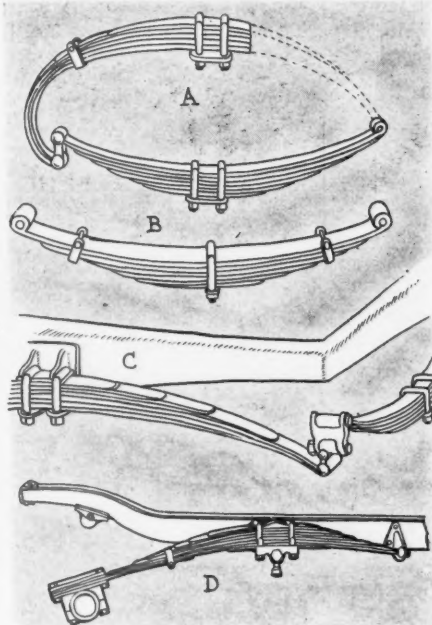


Fig. 2—Four spring type, that at A being the three-quarter elliptic and including the dotted line the elliptic, at B the semi-elliptic, at C the platform, and at D the cantilever

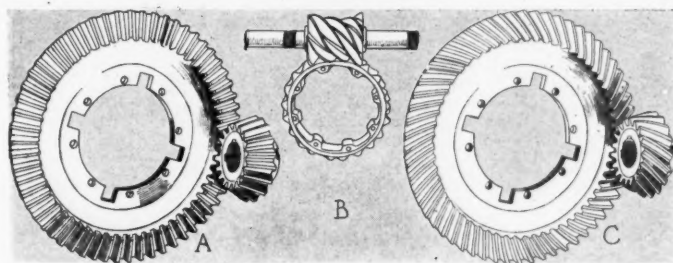


Fig. 3—Three types of final drive, that at A being the ordinary bevel, at B the worm, and at C the spiral bevel, which is referred to often as the helical bevel. The worm shown has the gear above the worm wheel. Another type has the worm below

tank from which it feeds to the carburetor by gravity.

Clutches—Both dry-disk and disk clutches running in oil are classed in the tables as disk. This also includes single-disk and multiple-disk. Those of the expanding and contracting band varieties are bands or shoes that contract or expand against the flywheel. The cone needs no explanation. The Owen car uses an electric transmission and the clutch type is given as electric.

Gearset Type—In the selective type of gearset any speed may be obtained without first going through any other speed. In the progressive, high speed cannot be obtained without first passing through the intermediate speeds. The friction transmission consists of a driven disk pressing against another disk known as the driving disk, the latter, in turn, being attached to a shaft, which directly or indirectly turns the wheels. The planetary is the type such as is used in the Ford. It gets its name from the fact that the gears revolve about one another as the earth and planets do about the sun.

Location Gearset—Unit with the rear axle, expressed as Rear A in the table, refers to the gearset and differential housing being a unit. The expression Unit M means that the motor and gearset housings are integral—a unit power plant. In the case of amidships the gearset is midway between motor and rear axle.

Final Drive—In what is called bevel drive, the power is transmitted from the propeller shaft through bevel gears to the rear wheels. There are two types of bevel axles, one called straight bevel and the other helical or spiral bevels. The helical bevel has the teeth curved as shown in Fig. 3. In the case of worm drive, gears of the worm type transmit the power to the rear wheels from the shaft. There are two types of worm gears, one with the worm on top and the other with it below the worm wheel. The top drive is shown in Fig. 3. In chain drive the motive power is carried from a jackshaft to the rear wheels by means of one or more chains.

Car Drives Through—Tor T refers to torsion tube or a tube surrounding the drive shaft. The torsion rod is simply a bar of steel fastened at one end to the differential case and at the other to a cross member of the frame. Radius rods, shown as Rad Rd. in the tables are attached at one end to the frame and at the other to rear axle housing. "Springs" means that the car is propelled through the rear springs the drive being commonly called the Hotchkiss.

Rear Axle—Four types of axles are used. The dead axle will be found only on cars driven by two chains, one to each rear wheel, the axle in this case not turning. In the floating axle, the entire weight over the rear wheels rests on the axle housing and wheel hubs. The axle shafts simply serve as a means of rotating the wheels and carry no weight. In the case of the semi-floating axle the bearing is in the axle housing and the axle may not be removed without first removing the wheel. This type of axle is required to carry some of the weight of the car. The three-quarter floating is exactly like the floating with the exception the ends of the axle shafts are permanently attached to the rear wheels by bolts and nuts perhaps, instead of flexibly as in the floating.

Gear Ratio—Crankshaft speed to wheel speed on high gear is what the figures in the table show; that is, if the gear ratio is given as 4 to 1, it means that the motor turns over four times to one revolution of the wheels on direct.

Springs—B, in Fig. 2, shows the semi-elliptic, A the three-quarter and when the view takes in the dotted line also, the elliptic spring. A shows the platform and D the cantilever.

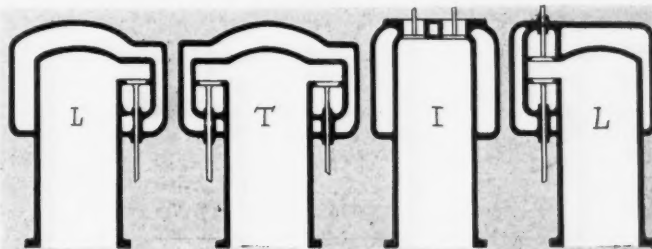
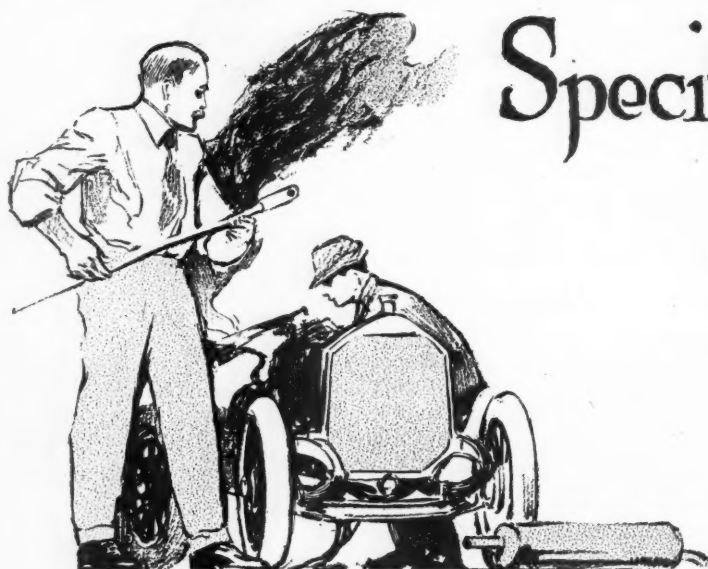


Fig. 4—Illustrating four cylinder types: the L-head, the T-head and the I-head, while that shown at the extreme right is an L-head with one set of valves in the head and the other in the side



Specifications of the 1915

Complete Technical Details of Each of the Chassis Models of Passenger Vehicles Produced by American Makers for the 1915 Season, Including S. A. E. Horsepower Ratings of Each, Cylinder Dimensions and Piston Displacement in Cubic Inches, as Well as Equipment of Carburetors and Magnelos

IN conformity with its custom in previous years Motor Age presents herewith the tables of specifications giving all the available data concerning American-made passenger chassis. In conjunction with this table Motor Age also publishes on page 33 brief descriptions of the various systems and devices which are mentioned in the tables, so that the unmechanical reader can understand all the technical expressions used. This Explanation of Tables, as it is called, describes the various ignition, oiling and fuel systems, also the four types of rear axles, etc.

There have been announced since the compilation of the tables, a number of chassis by prominent makers. In this list of late announcements is the Winton model 21A, listing at \$2,285, the specifications of which are in general like those of the model 21, which are here given. Another is the Monroe—a new small car with standard running gear and a 3 by

MAKE AND MODEL	No. of Cylinders	Bore and Stroke, Inches	S. A. E. H. P.	Piston Displacement Cubic Inches	CYLINDERS		Valve Location	Camshaft Drive	Cooling Circulation	LUBRICATION		IGNITION			CARBURETION			CRANKING SYSTEM	
					Shape	How Cast				System	Type of Pump	System	Make	Control	Make of Carburetor	Fuel Feed	Is Hot Air Pipe Fitted?	Type	Make
A																			
Abbott-Detroit, 34-40 K.....	4	4.125x5.250	27.25	280.6	L-Head..	Block.	Left..	Hel'l..	Pump...	Splash...	Gear....	Dual..	Splitdorf...	Hand.	Zenith...	Gravity.	Yes.....	Elec....	Auto-lite....
Abbott-Detroit, 44-50 L.....	4	4.500x5.500	32.40	349.9	L-Head..	Pairs..	Left..	Hel'l..	Pump...	Splash...	Gear....	Dual..	Splitdorf...	Hand.	Zenith...	Gravity.	Yes.....	Elec....	Auto-lite....
Abbott-Detroit, 50-60 F.....	6	3.750x5.250	33.75	347.8	L-Head..	Threes	Right.	Hel'l..	Pump...	Splash...	Gear....	Single.	Bosch....	Hand.	Zenith...	Pres....	Yes.....	Elec....	Auto-lite....
Allen, 34.....	4	3.625x5.000	20.25	206.4	L-Head..	Block.	Right.	Hel'l..	Thermo.	Splash...	Piston...	Single.	Wathse....	Hand.	Schebler...	Gravity.	Yes.....	Elec....	Wathse....
Apperson, 4-40.....	4	4.000x5.000	25.60	251.3	L-Head..	Block.	Right.	Spur...	Pump...	Pres....	Gear....	Single.	Eisemann...	Hand.	Rayfield...	Gravity.	Yes.....	Elec....	Bijur....
Apperson, 6-45.....	6	3.500x5.125	29.45	295.9	L-Head..	Block.	Right.	Spur...	Pump...	Pres....	Gear....	Single.	Eisemann...	Hand.	Rayfield...	Gravity.	Yes.....	Elec....	Bijur....
Apperson, 6-60.....	6	4.125x5.000	40.80	400.4	T-Head..	Block.	Opp...	Spur...	Pump...	Pres....	Gear....	Single.	Eisemann...	Hand.	Rayfield...	Gravity.	Yes.....	Elec....	Bijur....
Apperson, 6-60.....	6	4.125x5.000	40.80	400.9	T-Head..	Block.	Opp...	Spur...	Pump...	Pres....	Gear....	Single.	Eisemann...	Hand.	Rayfield...	Gravity.	Yes.....	Elec....	Bijur....
Apperson, 6-60.....	6	4.125x5.000	40.80	400.9	T-Head..	Block.	Opp...	Spur...	Pump...	Pres....	Gear....	Single.	Eisemann...	Hand.	Rayfield...	Gravity.	Yes.....	Elec....	Bijur....
Arbuz.....	4	4.125x5.250	27.25	280.6	L-Head..	Pairs..	Right.	Hel'l..	Pump...	Pres....	Gear....	Single.	At Kent...	Auto.	Schebler...	Gravity.	Yes.....	Elec....	Diehl....
Argo.....	4	2.317x4.000	8.54	67.1	L-Head..	Block.	Right.	Spur...	Thermo.	Splash...	Piston...	Single.	At Kent...	Hand.	.....	Gravity.	No.....	.....	.....
Auburn, 4-36.....	4	3.750x5.000	22.50	220.9	T-Head..	Block.	Opp...	Hel'l..	Pump...	Splash...	Central.	Single.	.....	Auto.	Rayfield...	Vacuum.	Yes.....	Elec....	.....
Auburn, 6-40.....	6	3.500x5.000	29.40	288.6	L-Head..	Block.	Right.	Hel'l..	Pump...	Spl-Pre...	Piston...	Single.	.....	H & A.	Rayfield...	Vacuum.	Yes.....	Elec....	.....
Auburn, 6-47.....	6	3.750x5.250	33.75	347.9	L-Head..	Pairs..	Left..	Hel'l..	Pump...	Spl-Pre...	Central.	Single.	Bosch....	H & A.	Rayfield...	Pres....	Yes.....	Elec....	.....
Austin, 66.....	6	4.500x6.000	48.60	572.5	T-Head..	Block.	Opp...	Hel'l..	Pump...	Splash...	None...	Dual..	Wathse....	H & A.	Master....	Vacuum.	Yes.....	Elec....	Wathse....
B																			
Bauer, 30.....	4	3.750x5.000	22.50	294.5	L-Head..	Block.	Right.	Spur...	Pump...	Spl-Pre...	Piston...	Single.	Mea.....	Hand.	Schebler...	Gravity.	Yes.....	Elec....	Emerson...
Briscoe.....	4	3.125x5.125	15.64	157.2	L-Head..	Block.	Right.	Chain.	Thermo.	Splash...	Piston...	Single.	Splitdorf...	Foot.	.....	Gravity.	No.....	Elec....	Apico....
Buick, C-24, C-25.....	4	3.750x3.750	22.50	165.6	I-Head..	Pairs..	Head..	Hel'l..	Pump...	Splash...	Gear....	Dual..	Delco....	Hand.	Marvel....	Gravity.	Yes.....	Elec....	Delco....
Buick, C-36, C-37.....	4	3.750x5.000	22.50	220.9	I-Head..	Pairs..	Head..	Hel'l..	Pump...	Splash...	Gear....	Dual..	Delco....	Auto.	Marvel....	Vacuum.	Yes.....	Elec....	Delco....
Buick, C-54, C-55.....	6	3.750x5.000	33.75	331.4	I-Head..	Pairs..	Head..	Hel'l..	Pump...	Splash...	Gear....	Dual..	Delco....	Auto.	Marvel....	Vacuum.	Yes.....	Elec....	Delco....
C																			
Cadillac.....	8	3.125x5.125	31.28	314.6	L-Head..	Fours.	L&R..	Chain.	Pump...	Spl-Pre...	Gear....	Dual..	Delco....	H & A.	Own.....	Pres....	No.....	Elec....	Delco....
Cartercar.....	4	3.500x5.000	19.61	192.4	L-Head..	Block.	Left..	Hel'l..	Pump...	Splash...	Piston...	Dual..	Delco....	Hand.	Schebler...	Pres....	Yes.....	Elec....	Delco....
Case, 25.....	4	3.750x4.750	22.50	314.6	T-Head..	Pairs..	Opp...	Hel'l..	Pump...	Splash...	Piston...	Single.	Wathse....	H & A.	Stromberg.	Gravity.	Yes.....	Elec....	Wathse....
Case, 35.....	4	4.250x5.500	28.90	312.0	T-Head..	Pairs..	Opp...	Hel'l..	Pump...	Splash...	Gear....	Dual..	Bosch....	Hand.	Rayfield...	Gravity.	Yes.....	Elec....	Wathse....
Case, 40.....	4	4.500x5.250	32.40	334.0	T-Head..	Pairs..	Opp...	Hel'l..	Pump...	Splash...	Gear....	2-Pt.	Bosch....	Hand.	Rayfield...	Pres....	Yes.....	Elec....	Wathse....
Chadwick, 19.....	6	5.000x6.000	60.00	721.0	L-Head..	Pairs..	S & H.	Hel'l..	Pump...	Pres....	Piston...	Doub.	Bosch....	Hand.	Own.....	Pres....	Yes.....	Elec....	Wathse....
Chadwick, 19.....	6	5.000x6.000	60.00	721.0	L-Head..	Pairs..	S & H.	Hel'l..	Pump...	Pres....	Piston...	Doub.	Bosch....	Hand.	Own.....	Pres....	Yes.....	Elec....	Wathse....
Chalmers, 26-B.....	6	3.500x5.500	29.45	317.5	T-Head..	Block.	Opp...	Hel'l..	Thermo.	Spl-Pre...	Gear....	Single.	At Kent...	H & A.	Rayfield...	Gravity.	Yes.....	Elec....	Entz....
Chalmers, Master 6.....	6	4.000x5.500	38.40	414.7	T-Head..	Block.	Opp...	Hel'l..	Thermo.	Splash...	Gear....	Single.	Bosch....	Hand.	Rayfield...	Pres-Gr.	Yes.....	Elec....	Entz....
Chandler, 15.....	6	3.375x5.000	33.75	331.4	L-Head..	Threes	Right.	Chain.	Pump...	Spl-Pre...	Gear....	Single.	Bosch....	Hand.	Rayfield...	Pres....	Yes.....	Elec....	G & D....

ABBREVIATIONS:—Valve Location: Side and head, S & H.; Left and right, L & R. Camshaft Drive: Helical gears, Hel'l.; Spur gears, Spur. Cooling Circulation: Thermo-siphon, Thermo. Lubrication System: Splash and pressure, Spl-Pre.; Pressure, Pres. Type of Pump: Flywheel, Flwhl.; Rotary, Rot.; Centrifugal, Cent. Ignition System: Double, Doub.; Two-point, 2-Pt. Ignition Make: Westinghouse, Wathse.; Atwater Kent, At Kent.; Connecticut, Conn. Ignition Control: Automatic, Auto.; Hand and automatic, H & A.; Hand or fixed, H or F. Make of Carburetor: Optional, Opt. Fuel Feed: Pressure-gravity, Pres-Gr. Type of Cranking System: Electric, Elec.; Electric and air, E. & Air. *6-inch tread optional. **Tread more or less than standard except Scripps-Booth, which is optional.

American Gasoline Passenger Cars

Specifications Include Every Mechanical Fact that Manufacturers, Dealers, and Buyers Require—Motor Design Specially Analyzed, Giving Engine Crankers, Fuel Feeds and Oil-ing Systems, also Transmission, Running Gear and Control Features Together with Tire Sizes Spring Suspension and Bearing Types



33/4-inch motor selling for \$460. One of the prominent makers, the Mercer company, has been unable to issue detailed information concerning its 1915 cars in time for insertion in the specification tables, the data on this line being promised for announcement in an early issue of Motor Age.

The specification tables, while enabling the prospective purchaser to select a car conforming to his ideas of mechanical perfection, will find invaluable data in the Buyers' Guide, which appears in this issue of Motor Age. This guide is a list of all the cars, segregated according to price and at the same time the body style, tire size, wheelbase, horsepower, etc., are given. Over 600 cars, ranging in price from \$250 to \$7,000, are listed in the guide.

Lighting System	TRANSMISSION								RUNNING GEAR				CONTROL		BEARINGS				MAKE AND MODEL	
	Clutch Type	GEARSET			Final Drive	Car Drives Through	Rear Axle	Total Gear Ratio on Direct	Wheel-base	TIRES		Wheels	Rear Springs	Location Steering Wheel	Gearshift Location	Crankshaft Type and No.	Gearset	Rear Axle		Front Wheel
		Type	Location	Forward Sp'ds						Front	Rear									
Auto-lite	Disk	Sel	Unit M	3	Bevel	Rad Rd	Float	3.75-1	116	34x4	34x4	Wood	Ell	Right	Right	Plain, 3	Roll	B&R	Roll	Abbott-Detroit, 34-40 K
Auto-lite	Disk	Sel	Unit M	3	Bevel	Rad Rd	Float	3.50-1	121	36x4	36x4	Wood	Ell	Right	Right	Plain, 3	Roll	B&R	Roll	Abbott-Detroit, 44-50 L
Auto-lite	Disk	Sel	Unit M	4	Bevel	Tor T	Float	4.00-1	130	35x4	35x4	Wood	Ell	Left	Cent	Plain, 3	Roll	B&R	Roll	Abbott-Detroit, 50-60 F
Waltham	Cone	Sel	Unit M	3	Bevel	Springs	Semi F	4.00-1	110	32x3	32x3	Wood	Ell	Left	Cent	Plain, 2	Ball	Roll	Ball	Allen, 34
Bijur	Con Bd	Sel	Amid	3	Bevel	Springs	Float		116	34x4	34x4	Wood	Ell	Left	Cent	Plain, 3				Apperson, 4-40
Bijur	Con Bd	Sel	Amid	3	Bevel	Springs	Float		126	34x4	34x4	Wood	Ell	Left	Cent	Plain, 4				Apperson, 6-45
Bijur	Con Bd	Sel	Amid	3	Bevel		Float		122	36x4	36x4	Wood	Ell	Left	Cent	Plain, 4				Apperson, 6-60
Bijur	Con Bd	Sel	Amid	3	Bevel		Float		128	36x4	36x4	Wood	Ell	Left	Cent	Plain, 4				Apperson, 6-60
Bijur	Con Bd	Sel	Amid	3	Bevel		Float		134	37x4	37x4	Wood	Ell	Left	Cent	Plain, 4				Apperson, 6-60
Wells	Cone	Sel	Rear A	3	Bevel	Rad Rd	Float	3.75-1	120	36x4	36x4	Wood	Semi E	Opt	Cent	Plain, 3	Roll	Roll	Ball	Arbens
At Kent	Cone	Prog	Amid	2	Bevel	Tor T	Semi F	4.25-1	90	28x2	28x2	Wire	Ell	Left	Cent	Plain, 2	Plain	Ball	Ball	Argo
	Cone	Sel	Unit M	3	Bevel	Springs	Float	4.08-1	114	32x4	32x4	Wood	Ell	Left	Cent	Plain, 3	B&R	Roll	Ball	Auburn, 4-36
	Cone	Sel	Unit M	3	Bevel	Springs	Float	4.00-1	126	34x4	34x4	Wood	Ell	Left	Cent		B&R	Ball	Ball	Auburn, 6-40
	Cone	Sel	Amid	3	Bevel	Springs	Float	4.50-1	135	37x4	37x4	Wood	Ell	Left	Cent		Ball	Ball	Ball	Auburn, 6-47
Waltham	Disk	Sel	Amid	3	Bevel	Springs	Float	3.00-1	141	34x4	34x4	Wood	Cant	Left	Cent	Plain, 4	Ball	Ball	Ball	Austin, 66
Emerson	Disk	Sel	Unit M	3	Bevel	Rad Rd	Float	4.00-1	110	34x3	34x3	Wood	Ell	Left	Cent	Plain, 2	Ball	Roll	Ball	Bauer, 30
Apico	Cone	Sel	Unit M	3	Bevel	Tor T	Float	4.00-1	107*	30x3	30x3	Opt	S-E	Opt	Cent	Plain, 2	Pl&B	B&R	Ball	Briscoe
Delco	Cone	Sel	Amid	3	Bevel	Tor Rd	Float	106*	106*	32x3	32x3	Wood	Ell	Left	Cent	Plain, 3	Ball	B&R	Ball	Buick, C-24, C-25
Delco	Cone	Sel	Amid	3	Bevel	Tor Rd	Float	3.50-1	112*	34x4	34x4	Wood	Ell	Left	Cent	Plain, 3	Ball	B&R	Ball	Buick, C-36, C-37
Delco	Cone	Sel	Amid	3	Bevel	Tor Rd	Float	3.75-1	130	36x4	36x4	Wood	Cant	Left	Cent	Plain, 4	Ball	Ball	Ball	Buick, C-54, C-55
Delco	Disk	Sel	Unit M	3	Sp. B	Springs	Float	4.42-1	122*	36x4	36x4	Wood	Plat	Left	Cent	Plain, 3	Ball	Roll	Roll	Cadillac
Delco		Fric	Amid		Chain	Rad Rd	Float	4.00-1	106	33x4	33x4	Wood	Ell	Right	Right	Plain, 3	Ball	B&R	Ball	Cartercar
Waltham	Disk	Sel	Unit M	3	Bevel	Tor T	Float	4.00-1	1151*	34x4	34x4	Wood	Cant	Left	Cent	Plain, 3	Roll	Ball	Roll	Case, 25
Waltham	Disk	Sel	Unit M	3	Bevel	Springs	Float	3.58-1	120*	35x4	35x4	Wood	Ell	Left	Cent	Plain, 3	Roll	B&R	Ball	Case, 35
Waltham	Disk	Sel	Amid	3	Bevel	Springs	Float		124*	37x4	37x4	Wood	Ell	Right	Right	Plain, 3	Roll	Roll	Roll	Case, 40
Waltham	Band	Sel	Amid	4	Chain	Rad Rd	Dead	2.25-1	133	36x4	37x5	Wood	Plat	Right	Right	Plain, 4	Ball	Ball	Ball	Chadwick, 19
Waltham	Band	Sel	Amid	4	Chain	Rad Rd	Dead	2.25-1	112	36x4	37x5	Wood	Plat	Right	Right	Plain, 4	Ball	Ball	Ball	Chadwick, 19
Entz	Disk	Sel	Rear A	3	Bevel	Tor T	Float	4.00-1	125	34x4	34x4	Wood	Ell	Left	Cent	Plain, 3	Roll	Roll	Roll	Chalmers, 26-B
Entz	Disk	Sel	Unit M	4	Bevel	Tor T	Float	4.00-1	132	36x4	36x4	Wood	Ell	Left	Cent	Plain, 3	Roll	Roll	Ball	Chalmers, Master 6
G & D	Disk	Sel	Unit M	3	Bevel	Tor Rd	Float	4.00-1	120	34x4	34x4	Wood	Ell	Left	Cent	Plain, 3	Ball	Ball	Roll	Chandler, 15

ABBREVIATIONS:—Make of Cranking System: North East, North-E.; Gray & Davis, G. & D.; Ward Leonard, Ward L.; Bosch-Rushmore, Bosch-R.; Allis-Chalmers, Allis-C.; Leece-Neville, Leece-Nev.; Splittorf-Apple, Splidf-Ap.; Entz-Dyneto, Entz-Dyn.; Robbins & Meyers, Rob-Myr.; Hendricks, Hendrix. **Clutch Type:** Contracting band, Con Bd.; Expanding band, Exp Bd. **Gearset Type:** Selective, Sel.; Progressive, Prog.; Frictional, Fric.; Planetary, Plan. **Gearset Location:** Unit with motor, Unit M.; Amidships, Amid.; Rear Axle, Rear A. **Final Drive:** Spiral bevel, Sp Bev. **Car Drives Through:** Radius rod, Rad Rd.; Torsion tube, Tor T.; Torsion arm, Tor A. **Rear Axle:** Floating, Float.; Semi-floating, Semi F.; Elliptic, Ell.; Non-floating, Non-Float. **Rear Springs:** Elliptic, Ell.; Cantilever, Cant.; Semi-elliptic, Semi E.; Platform, Plat. **Control:** Center, Cent. **Bearings:** Roller, Roll.; Ball and roller, B&R.; Plain and ball, Pl&B.; Plain and roller, Pl&R.



Specifications of American Passenger Cars, Including Horsepower

MAKE AND MODEL	No. of Cylinders	Bore and Stroke, Inches	S. A. E. H. P.	Piston Displacement Cubic Inches	CYLINDERS		Valve Location	Camshaft Drive	Cooling Circulation	LUBRICATION		IGNITION			CARBURETION			CRANKING SYSTEM	
					Shape	How Cast				System	Type of Pump	System	Make	Control	Make of Carburetor	Fuel Feed	Is Hot Air Pipe Fitted?	Type	Make
Chevrolet, Baby Grand	4	3.687x4.000	21.38	170.9	I-Head	Block	Head	Hel'l.	Thermo.	Splash	Gear	Single	Simms	Hand	Zenith	Gravity	Yes	Elec.	Auto-lite
Chevrolet, Royal Mail	4	3.687x4.000	21.38	170.9	I-Head	Block	Head	Hel'l.	Thermo.	Splash	Gear	Single	Simms	Hand	Zenith	Gravity	Yes	Elec.	Auto-lite
Cole, 4-40	4	4.250x5.250	28.90	297.8	L-Head	Pairs	Left	Hel'l.	Pump	Splash	Vacuum	Dual	Delco	Hand	Stromberg	Vacuum	Yes	Elec.	Delco
Cole, 6	6	4.250x5.250	43.80	446.7	L-Head	Pairs	Left	Chain	Pump	Splash	Vacuum	Dual	Delco	H & A	Stromberg	Pres.	Yes	Elec.	Delco
Cole, 6-50	6	3.500x5.000	29.40	288.6	L-Head	Block	Left	Hel'l.	Pump	Splash	Vacuum	Dual	Delco	Hand	Stromberg	Vacuum	Yes	Elec.	Delco
Corbitt, F. & E	4	4.000x4.500	25.60	226.2	L-Head	Pairs	Left	Spur	Pump	Splash	Central	Single	At Kent	Hand	Stromberg	Gravity	No	Elec.	Jones
Crawford, 6-35	6	3.500x5.000	29.45	288.6	L-Head	Block	Right	Hel'l.	Pump	Splash	Piston	Single	Wethse	H & A	Stromberg	Vacuum	Yes	Elec.	Wethse
Crow-Elkhart, E42, E45	4	4.000x5.000	25.60	251.3	L-Head	Pairs	Left	Hel'l.	Thermo.	Splash	Gear	Dual	Remy	Hand	Schebler	Gravity	Yes	Elec.	Emerson
Crow-Elkhart, E52, 54, 55, 56	4	4.250x5.500	28.90	312.0	L-Head	Block	Right	Hel'l.	Thermo.	Splash	Gear	Dual	Severson	Hand	Schebler	Gravity	Yes	Elec.	Emerson
Crow-Elkhart, E62, 64, 65, 66	6	3.750x5.500	33.75	364.4	L-Head	Block	Right	Hel'l.	Pump	Splash	Gear	Dual	Severson	Hand	Schebler	Gravity	Yes	Elec.	Emerson
Cunningham, S	4	4.750x5.750	36.10	407.6	I-Head	Pairs	Head	Hel'l.	Pump	Pres.	Gear	Dual	Undec	Hand	Stromberg	Pres.	Yes	Elec.	
Cycleplane-Tourist	4	2.500x4.000	10.00	100.6	L-Head	Block	Left	Gear	Thermo.	Spl-Pre	Piston	Single	Optional	Auto	Own	Gravity	Yes	None	
Cycleplane-Traveler	2	3.375x4.000	18.21	71.5	L-Head	Singly		L & H	Thermo.	Spl-Pre	Piston	Single	At Kent	Auto	Schebler	Gravity	None		
D																			
Davis, 38-A, 38-B	4	3.750x5.000	22.50	220.9	L-Head	Block	Right	Hel'l.	Thermo.	Splash	Piston	Single	Wethse	Hand	Stromberg	Gravity	Yes	Elec.	Wethse
Davis, 6-50	6	3.750x5.250	33.75	347.8	L-Head	Threes	Right	Hel'l.	Pump	Splash	Gear	Dup.	Bosch	Hand	Stromberg	Pres.	Yes	Elec.	G. & D.
Detroit, C	4	3.500x5.000	19.60	192.4	L-Head	Block	Right	Hel'l.	Thermo.	Splash	Flwhl.	Single	Wethse	H & A	Stromberg	Gravity	Yes	Elec.	Wethse
Dile, A	4	2.625x4.000	11.23	86.6	L-Head	Block	Right	Spur	Thermo.	Spl-Pre	Piston	Single	Berling	Fixed	Holley	Gravity	No		
Dodge	4	3.875x4.500	24.22	198.8	L-Head	Block	Right	Hel'l.	Pump	Splash	Eccen.	Single	Eisemann	Hand	Own	Pres.	Yes	Elec.	N. E.
Dorris, 1-A-4	4	4.375x5.000	30.63	300.7	I-Head	Pairs	Head	Hel'l.	Pump	Splash	Gear	Dual	Wethse	H & A	Stromberg	Vacuum	No	Elec.	Wethse
E																			
Empire, 34-40	4	3.750x4.500	22.50	198.8	L-Head	Pairs	Left	Chain	Thermo.	Splash	Piston	Single	Eisemann	H or F	Holley	Gravity	Yes	Elec.	Remy
Enger, Six-50	6	3.500x5.000	29.45	288.6	L-Head	Block	Right	Hel'l.	Pump	Spl-Pre	Piston	Single	At Kent	Auto	Rayfield	Gravity	Yes	Elec.	G. & D.
F																			
Fiat, 55	4	5.118x6.692	42.00	557.0	L-Head	Block	Left	Hel'l.	Pump	Pres.	Gear	Dual	Bosch	Hand	Own	Pres.	No	Elec.	Bosch-R.
Fiat, 50	6	4.330x5.905	45.00	529.9	L-Head	Block	Left	Hel'l.	Pump	Pres.	Gear	Dual	Bosch	Hand	Own	Pres.	No	Elec.	Bosch-R.
Firestone-Col., 82-E, 86-E	4	4.125x5.250	27.25	280.6	L-Head	Block	Left	Hel'l.	Pump	Spl-Pre	Gear	Dual	Splitdorf	Hand	Schebler	Gravity	No	Elec.	G. & D.
Firestone-Col., 90-E, 98-E	6	4.125x5.250	40.90	420.9	L-Head	Threes	Left	Hel'l.	Pump	Spl-Pre	Gear	Doub.	Conn.	Hand	Rayfield	Gravity	Yes	Elec.	G. & D.
Ford, T	4	3.750x4.000	22.50	176.7	L-Head	Block	Right	Spur	Thermo.	Splash	Flwhl.	Single	Own	Hand	Holley	Gravity	Yes	None	
Franklin, 6-30	6	3.625x4.000	31.60	247.7	I-Head	Singly	Head	Hel'l.	Air	Spl-Pre	Gear	Single	Eisemann	Auto	Own	Gravity	Yes	Elec.	Dyneto
F. R. P., 45-S	4	4.600x6.750	34.28	453.6	I-Head	Block	Head	Worm	Pump	Spl-Pre	Rotary	2-Pt.	Bosch	Hand	Stewart	Pres.	No	Elec.	Bosch
G																			
Glide, 30	4	3.500x5.000	19.60	192.4	L-Head	Block	Right	Hel'l.	Thermo.	Splash	Piston	Single	Wethse	H & A	Schebler	Gravity	Yes	Elec.	Wethse
Grant, M	4	2.750x4.000	12.10	95.0	L-Head	Block	Left	Hel'l.	Thermo.	Splash	Vacuum	Single	Swiss	Hand	Mayer	Gravity	Yes	Elec.	Allis-C.
Grant, T	6	2.875x4.250	20.00	165.5	L-Head	Block	Head	Hel'l.	Thermo.	Spl-Pre	Gear	Single	At Kent	Auto		Gravity	Yes	Elec.	Undec.
Great Western, A	4	4.250x5.500	28.90	312.0	L-Head	Singly	Head	Hel'l.	Pump	Spl-Pre	Piston	Single	Kingston	Hand	Kingston	Gravity	Yes	Elec.	G. & D.
Great Western, B	4	3.750x5.750	22.50	254.0	I-Head	Block	Head	Hel'l.	Pump	Spl-Pre	Cent.	Single	Kingston	Hand	Kingston	Gravity	Yes	Elec.	Bosch-R.
H																			
Haynes, 32	4	4.250x5.500	28.90	312.0	L-Head	Pairs	Right	Hel'l.	Pump	Splash	Piston	Dual	Simms	Hand	Stromberg	Pres.	Yes	Elec.	Leece-New
Haynes, 30	6	3.500x5.000	29.45	288.6	L-Head	Block	Right	Hel'l.	Pump	Splash	Piston	Dual	Remy	Hand	Rayfield	Vacuum	Yes	Elec.	Leece-New
Haynes, 31	6	4.250x5.000	43.80	468.0	L-Head	Pairs	Right	Hel'l.	Pump	Splash	Piston	Dual	Simms	Hand	Stromberg	Pres.	Yes	Elec.	Leece-New
Herff-Brooks, 4-40	4	4.500x5.000	32.40	318.1	L-Head	Singly	Left	Hel'l.	Pump	Splash	Gear	Single	Bosch	Hand	Stromberg	Gravity	Yes	Elec.	Splf-Ap.
Herff-Brooks, 6-50	6	4.000x4.500	38.40	339.2	L-Head	Singly	Left	Hel'l.	Pump	Splash	Gear	Single	Bosch	Hand	Stromberg	Gravity	Yes	Elec.	Splf-Ap.
Herreshoff, 4-16	4	2.375x3.250	8.77	57.8	L-Head	Block	Right	Hel'l.	Thermo.	Spl-Pre	Piston	Single	At Kent	Auto	Carter	Gravity		Elec.	Entz-Dyn.
Hudson, 6-40	6	3.500x5.000	29.40	288.6	L-Head	Block	Right	Hel'l.	Pump	Spl-Pre	Piston	Dual	Delco	H & A	Zenith	Gravity	Yes	Elec.	Delco
Hudson, 6-54	6	4.125x5.250	40.90	420.9	L-Head	Threes	Right	Hel'l.	Pump	Spl-Pre	Piston	Dual	Delco	Hand	Zenith	Gravity	Yes	Elec.	Delco
Hupmobile, H	4	3.250x5.500	16.90	182.5	L-Head	Block	Left	Chain	Thermo.	Pres.	Flwhl.	Single	Bosch	Hand	Zenith	Gravity	Yes	Elec.	Wethse
Hupmobile, K	4	3.375x5.500	18.25	196.8	L-Head	Block	Left	Chain	Thermo.	Pres.	Flwhl.	Single	At Kent	Auto	Zenith	Gravity	Yes	Elec.	Wethse
I																			
Imperial, 64	4	3.750x5.000	22.50	220.9	L-Head	Block	Right	Hel'l.	Thermo.	Splash	Piston	Single	At Kent		Stromberg	Gravity	Yes	Elec.	G. & D.
Imperial, 56	6	3.750x5.250	33.75	347.8	L-Head	Threes	Right	Hel'l.	Pump	Splash	Piston	Dual	Splitdorf	Hand	Stromberg	Vacuum	Yes	Elec.	North-E.
Inter-state, 71	4	3.500x5.000	19.60	192.4	L-Head	Block	Head	Hel'l.	Thermo.	Splash	Gear	Single		Hand		Gravity	Yes	Elec.	
J																			
Jackson-Olympic	4	4.500x5.250	32.40	334.0	L-Head	Pairs	Left	Hel'l.	Pump	Splash	Piston	Dual	Remy	Hand	Schebler	Gravity	Yes	Elec.	Auto-lite
Jackson, 6-48	6	3.500x5.000	29.40	288.6	L-Head	Block	Left	Hel'l.	Pump	Splash	Piston	Dual	Delco	H & A	Stromberg	Gravity	Yes	Elec.	Delco
Jeffery, 4	4	3.750x5.250	22.50	231.9	L-Head	Block	Right	Hel'l.	Pump	Spl-Pre	Piston	Dup.	Bosch	Hand	Rayfield	Pres.	Yes	Elec.	U. S. L.
Jeffery, 6	6	3.750x5.250	33.75	347.0	L-Head	Pairs	Left	Hel'l.	Pump	Spl-Pre	Piston	Single	Bosch	Hand	Rayfield	Vacuum	Yes	Elec.	U. S. L.
Jeffery-Chesterfield	6	3.000x5.000	21.60	212.0	L-Head	Block	Right	Hel'l.	Pump	Spl-Pre	Cent.	Single	Bosch	Hand	Rayfield	Vacuum	Yes	Elec.	Bijur
K																			
Kearns	4	2.875x4.000	13.37	106.1	I-Head	Block	Head	Hel'l.	Thermo.	Spl-Pre	Piston	Single	Berling	Hand	Zenith	Gravity	Yes	Elec.	Allis-C.
King, D	8	2.750x5.000	24.16	380.1	L-Head	Fours	L & R	Chain	Thermo.	Spl-Pre	Gear	Single		H & A			Yes	Elec.	Ward L.
King	4	3.937x5.000	24.98	243.5	L-Head	Block	Left	Hel'l.	Thermo.	Spl-Pre	Flwhl.	Single	At Kent	H & A	Stromberg	Gravity	Yes	Elec.	Ward L.
Kissel, 4-36	4	4.250x5.500	29.00	312.0	L-Head	Block	Right	Hel'l.	Pump	Splash	Gear	Single	Wethse	Auto	Stromberg	Vacuum	Yes	Elec.	Own

ABBREVIATIONS:—Valve Location: Side and head, S & H.; Left and right, L & R. Camshaft Drive: Helical gears, Hel'l.; Spur gears, Spur. Cooling Circulation: Thermo-syphon, Thermo. Lubrication System: Splash and pressure, Spl-Pre.; Pressure, Pres. Type of Pump: Flywheel, Flwhl.; Rotary, Rot.; Centrifugal, Cent. Ignition System: Double, Doub.; Two-point, 2-Pt. Ignition Make: Westinghouse, Wethse.; Atwater Kent, At Kent.; Connecticut, Conn. Ignition Control: Automatic, Auto.; Hand and automatic, H & A.; Hand or fixed, H or F. Make of Carburetor: Optional, Opt. Fuel Feed: Pressure-gravity, Pres-Gr. Type of Cranking System: Electric, Elec.; Electric and air, E & Air.

*60-inch tread optional. **Tread more or less than standard except Scripps-Booth, which is optional.

Carbureters, Crankers, Magnets, Etc, for 1915—Continued



Lighting System	TRANSMISSION								RUNNING GEAR				CONTROL			BEARINGS				MAKE AND MODEL
	Clutch Type	GEARSET			Final Drive	Car Drives Through	Rear Axle	Total Gear Ratio on Direct	Wheel-base	TIRES		Wheels	Rear Springs	Location Steering Wheel	Gearshift Location	Crankshaft Type and No.	Gearset	Rear Axle	Front Wheel	
		Type	Location	Forward Sp'ds						Front	Rear									
Auto-lite	Cone.	Sel.	Amid.	3	Bevel	Tor Rd.	Semi F.	4.00-1	106*	32x3	32x3	Wood	1 Ell.	Left	Cent.	Plain, 3.	Ball	B&R.	Ball	Chevrolet, Baby Grand
Auto-lite	Cone.	Sel.	Amid.	3	Bevel	Tor Rd.	Semi F.	4.00-1	106*	32x3	32x3	Wood	1 Ell.	Left	Cent.	Plain, 3.	Ball	B&R.	Ball	Chevrolet, Royal Mail
Delco	Cone.	Sel.	Unit M.	3	Bevel	Springs.	Semi F.	3.50-1	118*	34x4	34x4	Wood	1 Ell.	Left	Cent.	Plain, 3.	Ball	Roll	Roll	Cole, 4-40
Delco	Cone.	Sel.	Unit M.	3	Bevel	Springs.	Float	3.93-1	136	36x4	36x4	Wood	1 Ell.	Left	Cent.	Plain, 3.	Ball	Roll	Roll	Cole, 6
Delco	Cone.	Sel.	Unit M.	3	Bevel	Tor Rd.	Float	4.67-1	126*	35x4	35x4	Wood	S-E	Left	Cent.	Plain, 4.	Ball	Roll	Roll	Cole, 6-50
Jones	Disk	Sel.	Unit M.	3	Bevel	Springs.	Float	4.00-1	120	34x4	34x4	Wood	1 Ell.	Right	Cent.	Plain, 3.	Ball	Ball	Ball	Corbitt, F. & E
Wthae	Disk	Sel.	Unit M.	3	Sp Bev.	Springs.	1/2 Float.	3.90-1	120	34x4	34x4	Wood	1 Ell.	Left	Cent.	Plain, 3.	Roll	Roll	Roll	Crawford, 6-35
Remy	Disk	Sel.	Rear A.	3	Bevel	Rad Rd.	1/2 Float.	4.00-1	114	33x4	33x4	Wood	1 Ell.	Right	Cent.	Plain, 3.	Plain	Roll	Ball	Crow-Elkhart, E42, E45
Ward L	Disk	Sel.	Rear A.	3	Bevel	Rad Rd.	Float	4.00-1	120	34x4	34x4	Wood	1 Ell.	Right	Cent.	Plain, 3.	Plain	Roll	Ball	Crow-Elkhart, E52, 54, 55, 56
Ward L	Disk	Sel.	Unit M.	3	Bevel	Rad Rd.	Float	4.00-1	130	36x4	36x4	Wood	1 Ell.	Right	Cent.	Plain, 4.	Plain	Roll	Ball	Crow-Elkhart, E62, 64, 65, 66
	Disk	Sel.	Unit M.	3	Sp Bev.	Springs.	Float	3.50-1	129	37x5	37x5	Wood	1 Ell.	Left	Cent.	Plain, 3.	Ball	Roll	Roll	Cunningham, S
	Disk	Sel.	Unit M.	3	Bevel	Rad Rd.	Semi F.	3.00-1	108**	28x3	28x3	Wire	1 Ell.	Left	Cent.	Plain, 2.	Plain	B&R.	Ball	Cycleplane-Tourist
	Plan.	Amid.		2	Chain	Rad Rd.	Live	3.00-1	96**	28x2	28x2	Wire	S-E	Cent.	Right	Roll	Plain	Ball	Ball	Cycleplane-Traveler
																				D
Wthae	Cone.	Sel.	Unit M.	3	Bevel	Springs.	1/2 Float.	4.00-1	112	34x4	34x4	Wood	1 Plat.	Left	Cent.	Plain, 3.	B&R.	Roll	Ball	Davis, 38-A, 38-B
G. & D.	Disk	Sel.	Unit M.	4	Bevel	Rad Rd.	Float	3.75-1	128	37x4	37x4	Wood	1 Plat.	Left	Cent.	Plain, 3.	Ball	B&R.	Ball	Davis, 6-50
Wthae	Disk	Sel.	Unit M.	3	Bevel	Tor T.	Float	4.30-1	112	32x3	32x3	Wood	1 Plat.	Left	Cent.	Ball, 2.	Ball	Ball	Ball	Detroit, C
Dyneto	Disk	Sel.	Amid.	3	Bevel	Springs.	Semi F.	4.00-1	96**	28x3	28x3	Wire	1 Ell.	Left	Cent.	Plain, 3.	Ball	Ball	Ball	Dile, A
N. E.	Cone.	Sel.	Unit M.	3	Bevel	Tor T.	Float	3.61-1	110*	32x3	32x3	Wood	1 Ell.	Left	Cent.	Plain, 3.	Ball	Roll	Ball	Dodge
Wthae	Disk	Sel.	Unit M.	3	Sp Bev.	Springs.	1/2 Float.	4.08-1	121	36x4	36x4	Wood	1 Plat.	Left	Cent.	Plain, 3.	Roll	Roll	Roll	Dorris, 1-A-4
																				E
Remy	Disk	Sel.	Unit M.	3	Bevel	Springs	Semi F.	4.00-1	108	32x3	32x3	Wood	1 Ell.	Right	Cent.	Plain, 3.	Ball	Roll	Ball	Empire, 34-40
G. & D.	Disk	Sel.	Unit M.	3	Bevel	Springs	Float	3.78-1	125	34x4	34x4	Wood	1 Ell.	Left	Cent.	Plain, 3.	Roll	B&R.	Ball	Enger, Six-50
																				F
Bosch-R.	Disk	Sel.	Amid.	4	Bevel	Tor T.	Semi-F.		128	36x4	37x5	Opt.	1 Ell.	Right	Right	Plain, 3.	Ball	Ball	Ball	Fiat, 55
Bosch-R.	Disk	Sel.	Amid.	4	Bevel	Tor T.	Semi-F.		135	36x4	37x5	Opt.	1 Ell.	Right	Right	Plain, 4.	Ball	Ball	Ball	Fiat, 50
G. & D.	Cone.	Sel.	Amid.	3	Bevel	Tor T.	Float	3.50-1	116	34x4	34x4	Wood	1 Ell.	Left	Cent.	Plain, 3.	Ball	Ball	Ball	Firestone-Col., 82-E, 86-E
G. & D.	Disk	Sel.	Unit M.	3	Bevel	Tor T.	Float	3.50-1	132	36x4	36x4	Wood	1 Ell.	Left	Cent.	Plain, 3.	Ball	Ball	Ball	Firestone-Col., 90-E, 98-E
	Disk	Plan.	Unit M.	2	Bevel	Tor T.	Semi-F.	3.63-1	100	30x3	30x3	Wood	Cross.	Left	Pedal	Plain, 3.	Plain	Roll	Ball	Ford, T
Dyneto	Disk	Sel.	Amid.	3	Sp Bev.	Springs	Semi-F.	3.70-1	120	34x4	34x4	Wood	1 Ell.	Left	Cent.	Plain, 7.	Ball	Roll	Roll	Franklin, 6-30
Bosch.	Cone.	Sel.	Amid.	4	Bevel	Tor T.	Float	Opt.	Opt.	36x4	36x5	Wire	S-E	Right	Right	Plain, 3.	Ball	Ball	Ball	F.R.P., 45-B
																				G
Wthae	Disk	Sel.	Unit M.	3	Bevel	Springs	1/2 Float.	4.00-1	114	32x4	32x4	Wood	1 Ell.	Left	Cent.	Plain, 3.	Ball	Ball	Ball	Glide, 30
Al-Ch.	Cone.	Prog.	Rear A.	2	Bevel	Rad Rd.	1/2 Float.	4.50-1	90	28x3	28x3	Wire	Cross.	Left	Cent.	Plain, 2.	B&R.	Roll	Ball	Grant, M
Undec.	Cone.	Sel.	Unit M.	3	Bevel	Rad Rd.	Float	4.00-1	106*	30x3	30x3	Wood	Cant.	Left	Cent.	Plain, 3.	B&R.	B&R.	Ball	Grant, T
G. & D.	Cone.	Sel.	Unit M.	3	Bevel	Tor T.	Float	3.50-1	117	36x4	36x4	Wood	1 Ell.	Right	Right	Plain, 5.	Roll	B&R.	Ball	Great Western, A
Bosch-R.	Cone.	Sel.	Unit M.	3	Bevel	Tor T.	Float	4.00-1	117	34x4	34x4	Wood	1 Ell.	Left	Cent.	Plain, 3.	Ball	B&R.	Ball	Great Western, B
																				H
Leece-Nev.	Con Bd.	Sel.	Unit M.	3	Bevel	Springs	Float	3.69-1	118	34x4	34x4	Wood	1 Ell.	Left	Cent.	Plain, 3.	Roll	Ball	Ball	Haynes, 32
Leece-Nev.	Disk	Sel.	Unit M.	3	Bevel	Springs	Float	4.00-1	121	34x4	34x4	Wood	S-E	Left	Cent.	Plain, 3.	Ball	Ball	Ball	Haynes, 30
Leece-Nev.	Con Bd.	Sel.	Unit M.	3	Bevel	Springs	Float	3.66-1	130	36x4	36x4	Wood	1 Ell.	Left	Cent.	Plain, 4.	Roll	Roll	Roll	Haynes, 31
Spidf-Ap	Cone.	Elec.	Amid.	3	Bevel	Springs	Semi-F.	4.00-1	118	34x4	34x4	Wood	1 Ell.	Left	Cent.	Plain, 5.	B&R.	Ball	Roll	Herff-Brooks, 4-40
Spidf-Ap	Cone.	Elec.	Amid.	3	Bevel	Springs	Semi-F.	4.00-1	124	34x4	34x4	Wood	1 Ell.	Left	Cent.	Plain, 7.	B&R.	Ball	Roll	Herff-Brooks, 6-50
Dyneto	Cone.	Sel.	Amid.	3	Bevel		Semi-F.	4.00-1	94**	28x3	28x3	Wire	1 Ell.	Left	Cent.	Ball	Ball	Ball	Ball	Herrschhoff, 4-16
Delco	Disk	Sel.	Unit M.	3	Sp Bev.	Springs	Semi-F.	3.77-1	123	34x4	34x4	Wood	1 Ell.	Left	Cent.	Plain, 3.	Roll	Roll	Roll	Hudson, 6-40
Delco	Disk	Sel.	Unit M.	4	Bevel	Springs	Float	3.77-1	135**	36x4	36x4	Wood	1 Ell.	Left	Cent.	Plain, 3.	Roll	Roll	Roll	Hudson, 6-54
Wthae	Disk	Sel.	Unit M.	3	Bevel	Springs	Float	3.86-1	106*	33x4	33x4	Wood	Cross.	Right	Cent.	Plain, 3.	Roll	Roll	Roll	Hupmobile, H
Wthae	Disk	Sel.	Unit M.	3	Bevel	Springs	Float	4.25-1	119*	34x4	34x4	Wood	S-E	Left	Cent.	Plain, 3.	B&R.	Ball	Roll	Hupmobile, K
																				I
G. & D.	Disk	Sel.	Unit M.	3	Bevel	Springs	1/2 Float.	4.00-1	115	32x3	32x3	Wood	1 Ell.	Left	Cent.	Plain, 3.	Ball	Roll	Ball	Imperial, 64
North-E.	Disk	Sel.	Unit M.	3	Bevel		Float	3.87-1	130	36x4	36x4	Wood	1 Ell.	Left	Cent.					Imperial, 56
	Cone.	Sel.	Rear A.	3	Bevel	Tor T.	1/2 Float.	4.00-1	110	33x4	33x4	Wood	1 Ell.	Left	Cent.	Plain, 3.	B&R.	Roll	Ball	Interstate, 71
																				J
Auto-lite	Cone.	Sel.	Unit M.	3	Bevel	Rad Rd.	Float	3.50-1	117	34x4	34x4	Wood	1 Ell.	Left	Cent.	Plain, 3.	Ball	Roll	Ball	Jackson-Olympic
Delco	Cone.	Sel.	Unit M.	3	Bevel	Rad Rd.	Float	4.00-1	125	34x4	34x4	Wood	1 Ell.	Left	Cent.	Plain, 4.	B&R.	B&R.	Ball	Jackson, 6-48
U. S. L.	Cone.	Sel.	Amid.	4	Bevel	Springs	Float	4.07-1	116	34x4	34x4	Wood	1 Ell.	Left	Cent.	Plain, 3.	Ball	Ball	Roll	Jeffery, 4
U. S. L.	Disk	Sel.	Amid.	4	Sp Bev.	Springs	Float	3.50-1	133	34x4	34x4	Wood	1 Ell.	Left	Cent.	Plain, 3.	Ball	Ball	Roll	Jeffery, 6
Bijur	Disk	Sel.	Amid.	4	Worm	Springs	Float	4.50-1	122	34x4	34x4	Wood	Cant.	Left	Cent.	Plain, 3.	Ball	Ball	Roll	Jeffery-Chesterfield
																				K
Allis-C.	Cone.	Sel.	Unit M.	3	Bevel	Springs	Semi F.	4.00-1	100	28x3	28x3	Wood	1 Ell.	Opt.	Cent.	Plain, 2.	Ball	B&R.	Ball	Kearns
Ward L	Disk	Sel.	Unit M.	3	Bevel	Springs	Float		113	33x4	33x4	Wood	Cant.	Left	Cent.	Plain, 3.	Roller	Ball	Ball	King, D
Ward L	Disk	Sel.	Unit M.	3	Bevel	Springs	Float	3.70-1	113	33x4	33x4	Wood	Cant.	Left	Cent.	Plain, 3.	Plain	Ball	Ball	King
Wthae	Cone.	Sel.	Unit M.	3	Bevel	Springs	Float	4.00-1	121	34x4	34x4	Wood	1 Ell.	Left	Cent.	Plain, 3.	Ball	Roll	Roll	Kissel, 4-36

ABBREVIATIONS:—Make of Cranking System: North East, North-E.; Gray & Davis, G. & D.; Ward Leonard, Ward L.; Bosch-Rushmore, Bosch-R.; Allis-Chalmers, Allis-C.; Leece-Neville, Leece-Nev.; Spiltdorf-Apple, Spidf-Ap.; Entz-Dyneto, Entz-Dyn.; Robbins & Meyers, Rob-Myr.; Hendricks, Hendrix. Clutch Type: Contracting band, Con Bd.; Expanding band, Exp Bd. Gearset Type: Selective, Sel.; Progressive, Prog.; Frictional, Fric.; Planetary, Plan. Gearset Location: Unit with motor, Unit M.; Amidships, Amid; Rear Axle, Rear A. Final Drive: Spiral bevel, Sp Bev. Car Drives Through: Radius rod, Rad Rd.; Torsion tube, Tor T.; Torsion arm, Tor A. Rear Axle: Floating, Float.; Semi-floating, Semi F.; 1/2 floating, 1/2 Float.; Non-floating, Non-Float. Rear Springs: 1/2 elliptic, 1/2 Ell.; Elliptic, Ell.; Cantilever, Cant.; Semi-elliptic, Semi E.; Platform, Plat.; 1/2 Ell. Control: Center, Cent. Bearings: Roller, Roll.; Ball and roller, B&R.; Plain and ball, Pl&B.; Plain and roller, Pl&R.



Specifications of American Passenger Cars, Including Horsepower

MAKE AND MODEL	No. of Cylinders	Bore and Stroke, Inches	S. A. E. H. P.	Piston Displacement Cubic Inches	CYLINDERS		Valve Location	Camshaft Drive	Cooling Circulation	LUBRICATION		IGNITION			CARBURETION			CRANKING SYSTEM		
					Shape	How Cast				System	Type of Pump	System	Make	Control	Make of Carburetor	Fuel Feed	Is Hot Air Pipe Fitted?	Type	Make	
Kissel, 42.....	6	3.625x5.500	31.37	309.3	L-Head..	Block	Right..	Hel'l..	Pump...	Splash..	.....	Single..	Wathse...	Hand..	Stromberg..	.....	Yes....	Elec....	Own.....
Kissel, 6-48.....	6	4.000x5.500	33.40	339.2	L-Head..	Block	Left... Hel'l..	Chain..	Pump...	Splash..	Gear....	Single..	Mea.....	Hand..	Rayfield..	Vacuum..	Yes....	Elec....	Own.....	
Kissel, 6-60.....	6	4.500x5.250	48.60	501.0	L-Head..	Pairs..	Left... Hel'l..	Chain..	Pump...	Splash..	Gear....	Single..	Bosch...	Hand..	Rayfield..	Pres....	Yes....	Elec....	Own.....	
Kline, 6-42.....	6	3.500x5.125	29.40	197.2	L-Head..	Block	Right..	Hel'l..	Pump...	Spl-Pre...	Gear....	Single..	Wathse...	Hand..	Stromberg..	Vacuum..	Yes....	Elec....	Wathse...	
Kline, 6-42 A.....	6	3.500x5.125	29.40	197.2	L-Head..	Block	Right..	Hel'l..	Pump...	Spl-Pre...	Gear....	Single..	Wathse...	Hand..	Stromberg..	Vacuum..	Yes....	Elec....	Wathse...	
Krit, O.....	4	3.750x4.000	22.50	176.7	L-Head..	Block	Right..	Hel'l..	Thermo..	Splash..	Flwhl..	Single..	Remy....	Hand..	Johnson..	Gravity..	Yes....	Elec....	Disco....	
Krit, M.....	4	3.750x4.000	22.50	176.7	L-Head..	Block	Right..	Hel'l..	Thermo..	Splash..	Flwhl..	Single..	Bosch...	Hand..	Stromberg..	Gravity..	Yes....	Elec....	North E....	
L.....	4	3.750x4.000	22.50	176.7	L-Head..	Block	Left... Hel'l..	Hel'l..	Pump...	Spl-Pre...	Piston...	Single..	Briggs...	Hand..	Schebler..	Gravity..	Yes....	Elec....	Briggs...	
Lambert, 48-C.....	4	4.125x5.250	27.25	230.6	L-Head..	Block	Left... Hel'l..	Hel'l..	Pump...	Spl-Pre...	Piston...	Single..	Briggs...	Hand..	Schebler..	Gravity..	Yes....	Elec....	Briggs...	
Lenox, 4.....	4	4.250x5.500	29.00	312.0	L-Head..	Block	Right..	Hel'l..	Pump...	Spl-Pre...	Piston...	Dual...	Wathse...	H&A...	Own.....	Gravity..	No.....	Elec....	Wathse...	
Lenox, 6.....	6	3.750x5.500	33.75	364.4	L-Head..	Block	Right..	Hel'l..	Pump...	Spl-Pre...	Piston...	Dual...	Wathse...	H&A...	Own.....	Gravity..	No.....	Elec....	Wathse...	
Lewis, 6.....	6	3.500x6.000	29.40	346.4	L-Head..	Block	Head... Chain..	Chain..	Pump...	Spl-Pre...	Piston...	Single..	Remy....	Hand..	Stromberg..	Vacuum..	Yes....	Elec....	Remy....	
Lexington, 6-L.....	6	3.500x5.000	29.40	288.6	L-Head..	Block	Right..	Hel'l..	Pump...	Spl-Pre...	Piston...	Single..	Wathse...	H&A...	Schebler..	Vacuum..	Yes....	Elec....	Wathse...	
Lexington, 6-M.....	6	4.125x5.000	40.90	400.9	L-Head..	Threes	Right..	Hel'l..	Pump...	Spl-Pre...	Piston...	Single..	At Kent..	H&A...	Stromberg..	Vacuum..	Yes....	Elec....	Jones...	
Locomobile, M-5.....	6	4.500x5.500	48.60	524.8	T-Head..	Pairs..	Opp... Hel'l..	Hel'l..	Pump...	Spl-Pre...	Gear....	Dual...	Bosch...	Hand..	Own.....	Pres....	Yes....	Elec....	Wathse...	
Locomobile, R-4.....	6	4.250x5.000	43.80	425.6	T-Head..	Pairs..	Opp... Hel'l..	Hel'l..	Pump...	Spl-Pre...	Gear....	Dual...	Bosch...	Hand..	Own.....	Pres....	Yes....	Elec....	Wathse...	
Luverne, 760.....	6	4.000x5.000	38.60	376.9	L-Head..	Pairs..	Left... Hel'l..	Thermo..	Splash..	.....	Gear....	Dup....	Bosch...	Hand..	Schebler..	Gravity..	No.....	Elec....	Jones...
Lyons-Knight, K-4.....	4	4.500x5.500	32.40	349.9	Knight..	Pairs..	Sleeve.. Chain..	Chain..	Pump...	Pres....	Piston...	Dual...	Simms...	Hand..	Stromberg..	Gravity..	Yes....	Elec....	North-E....	
M.....	4	3.625x4.500	20.25	185.8	L-Head..	Block	Right..	Hel'l..	Thermo..	Splash..	Piston...	Dual...	Simms...	Hand..	Kingston..	Gravity..	Yes....	Elec....	Huff....
Maxwell, 25.....	4	3.625x4.500	20.25	185.8	L-Head..	Block	Right..	Hel'l..	Thermo..	Splash..	Piston...	Dual...	Simms...	Hand..	Kingston..	Gravity..	Yes....	Elec....	Huff....
McFarlan, T.....	6	4.000x6.000	38.40	452.4	T-Head..	Block	Opp... Hel'l..	Hel'l..	Pump...	Splash..	.....	Single..	Wathse...	H&A...	Stromberg..	Vacuum..	Yes....	E&Air...	.....
McFarlan, X.....	6	4.500x6.000	48.40	572.5	T-Head..	Block	Opp... Hel'l..	Hel'l..	Pump...	Splash..	.....	Single..	Wathse...	H&A...	Stromberg..	Vacuum..	Yes....	E&Air...	.....
McIntyre, 75.....	4	3.750x4.250	22.50	187.7	L-Head..	Block	Left... Spur..	Thermo..	Splash..	.....	Piston...	Single..	Bosch...	Hand..	Holley...	Gravity..	Yes....	Elec....	Spld-A...
McIntyre, 6-40.....	6	3.500x4.500	29.40	259.8	T-Head..	Block	Opp... Chain..	Thermo..	Splash..	.....	Piston...	Single..	Briggs...	Hand..	Stromberg..	Gravity..	Yes....	Elec....	Briggs...
Meteor, 42.....	4	4.000x5.000	25.60	251.3	L-Head..	Pairs..	Left... Hel'l..	Pump...	Spl-Pre...	Gear....	Single..	At Kent..	H&A...	.....	.....	Gravity..	Yes....	Elec....	Spld-A...
Meteor, 45.....	6	3.750x5.000	33.60	331.4	L-Head..	Pairs..	Left... Hel'l..	Pump...	Spl-Pre...	Gear....	Single..	At Kent..	H&A...	.....	.....	Gravity..	Yes....	Elec....	Spld-A...
Metz, 22.....	4	3.750x4.000	22.50	176.7	L-Head..	Block	Right.. Spur..	Thermo..	Splash..	.....	Gear....	Single..	Bosch...	Fixed..	.....	Gravity..	Opt....	Elec....	G. & D....
Mitchell-Lewis, 4.....	4	4.000x5.500	25.60	276.5	L-Head..	Pairs..	Left... Hel'l..	Pump...	Spl-Pre...	Piston...	Single..	Conn....	Hand..	.....	.....	Vacuum..	Yes....	Elec....	Spld-Ap...
Mitchell-Lewis, 6.....	6	4.000x5.500	38.40	414.8	L-Head..	Pairs..	Left... Hel'l..	Pump...	Spl-Pre...	Piston...	Single..	Conn....	Hand..	.....	.....	Vacuum..	Yes....	Elec....	Spld-Ap...
Mitchell-Lewis, 7-6.....	6	4.250x7.000	43.80	595.8	T-Head..	Pairs..	Opp... Hel'l..	Pump...	Spl-Pre...	Piston...	Dual...	Remy....	Hand..	.....	.....	Gravity..	Yes....	Elec....	Remy....
Mitchell-Lewis, 5-6.....	6	4.250x6.000	43.80	430.6	T-Head..	Pairs..	Opp... Hel'l..	Pump...	Spl-Pre...	Piston...	Dual...	Remy....	Hand..	.....	.....	Gravity..	Yes....	Elec....	Remy....
Moline-Knight.....	4	4.000x6.000	25.60	301.6	Knight..	Block	Sleeve.. Chain..	Chain..	Thermo..	Spl-Pre...	Gear....	Dual...	Bosch...	Hand..	Schebler..	Pres....	Yes....	Elec....	Wagner...	
Marmon, 41.....	6	4.250x5.500	43.80	468.0	L-Head..	Threes	Right.. Hel'l..	Pump...	Pres....	Gear....	Dual...	Bosch...	Hand..	Stromberg..	Vacuum..	Yes....	Elec....	Bosch...	Bosch...	
Marmon, 48.....	6	4.500x6.000	48.60	577.5	T-Head..	Pairs..	Left... Hel'l..	Pump...	Pres....	Gear....	2-pt...	Bosch...	Hand..	Zenith...	Pres....	Yes....	Elec....	Bosch...	Bosch...	
Monarch, 6.....	6	3.500x5.000	29.40	288.6	L-Head..	Block	Right.. Hel'l..	Pump...	Splash..	.....	Piston...	Dual...	At Kent..	Auto..	Zephyr...	Gravity..	Yes....	Elec....	Ward L....
Moon, 4-38.....	4	3.750x5.000	22.50	220.9	L-Head..	Block	Right.. Hel'l..	Pump...	Spl-Pre...	.....	Dual...	Delco...	Hand..	Opt....	.....	Vacuum..	.....	Elec....	Delco...
Moon, 6-40.....	6	3.500x5.000	29.45	288.4	L-Head..	Block	Right.. Hel'l..	Pump...	Spl-Pre...	.....	Dual...	Delco...	Hand..	Op'....	.....	Vacuum..	.....	Elec....	Delco...
Mora, D-4.....	4	4.625x5.000	34.28	336.0	I-Head..	Singly..	Head... Spur..	Pump...	Splash..	.....	Gear....	Dual...	Eisemann..	Hand..	Stromberg..	Gravity..	Yes....	Elec....	G. & D....
N.....	6	3.750x5.500	33.75	364.4	L-Head..	Block	Right.. Hel'l..	Pump...	Spl-Pre...	Gear....	Single..	Eisemann..	Hand..	Rayfield..	Pres....	Yes....	Elec....	Remy....	Remy....	
National, AA.....	6	3.750x5.500	33.75	364.4	L-Head..	Block	Right.. Hel'l..	Pump...	Spl-Pre...	Gear....	Single..	Eisemann..	Hand..	Rayfield..	Pres....	Yes....	Elec....	Remy....	Remy....	
Norwalk, F.....	6	3.500x5.125	29.45	295.9	L-Head..	Block	Left... Hel'l..	Pump...	Spl-Pre...	Gear....	Single..	At Kent..	H&A...	Rayfield..	Vacuum..	Yes....	Elec....	G. & D....	G. & D....	
O.....	4	3.500x5.000	19.60	192.4	L-Head..	Block	Left... Hel'l..	Pump...	Splash..	.....	Piston...	Dual...	Delco...	H&A...	Marvel...	Vacuum..	Yes....	Elec....	Delco...
Oakland, 37.....	6	3.500x5.000	29.45	288.4	L-Head..	Block	Left... Hel'l..	Pump...	Splash..	.....	Piston...	Dual...	Delco...	H&A...	Johnson..	Vacuum..	Yes....	Elec....	Delco...
Oldsmobile, 42.....	4	3.500x5.000	19.60	192.4	L-Head..	Block	Head... Hel'l..	Pump...	Splash..	.....	Piston...	Dual...	Delco...	Auto..	Marvel...	Pres....	Yes....	Elec....	Delco...
Oldsmobile, 55.....	6	4.250x5.250	43.80	446.7	L-Head..	Pairs..	Head... Hel'l..	Pump...	Splash..	.....	Piston...	Dual...	Delco...	Auto..	Marvel...	Pres....	Yes....	Elec....	Delco...
Overland, 80.....	4	4.125x4.500	27.25	240.5	L-Head..	Singly..	Left... Hel'l..	Thermo..	Splash..	.....	Gear....	Single..	Bosch...	Hand..	Schebler..	Gravity..	Yes....	Elec....	Auto-lite...
Overland, 81.....	4	4.000x4.500	25.60	226.2	L-Head..	Singly..	Left... Hel'l..	Thermo..	Splash..	.....	Gear....	Single..	Splitdorf..	Hand..	Schebler..	Gravity..	Yes....	Elec....	Auto-lite...
Overland, 82.....	6	3.500x5.250	29.40	303.1	L-Head..	Block	Right.. Hel'l..	Pump...	Splash..	.....	Piston...	Single..	Bosch...	Hand..	Schebler..	Vacuum..	Yes....	Elec....	Auto-lite...
Owen.....	6	3.625x5.500	.....	.....	I-Head..	Block	Head... Hel'l..	Pump...	Pres....	Gear....	Dual...	Remy....	Hand..	.....	.....	.....	.....	Elec....	Own.....
P.....	6	4.000x5.500	38.40	414.7	L-Head..	Threes	Right.. Hel'l..	Pump...	Pres....	Gear....	Single..	Bosch...	Hand..	Own.....	Pres....	Yes....	Elec....	Bijur...	Bijur...	
Packard, 3-38.....	6	4.500x5.500	48.60	524.8	L-Head..	Threes	Right.. Hel'l..	Pump...	Pres....	Gear....	Single..	Bosch...	Hand..	Own.....	Pres....	Yes....	Elec....	Bijur...	Bijur...	
Packard, 5-48.....	6	4.500x5.500	48.60	524.8	L-Head..	Threes	Right.. Hel'l..	Pump...	Pres....	Gear....	Single..	Bosch...	Hand..	Own.....	Pres....	Yes....	Elec....	Bijur...	Bijur...	
Paige-Detroit, 6.....	6	3.500x5.250	29.45	303.1	L-Head..	Block	Right.. Worm..	Pump...	Splash..	.....	Gear....	Dual...	Bosch...	Hand..	.....	Gravity..	Yes....	Elec....	G. & D....
Partin-Palmer, 20.....	4	3.125x4.000	15.64	122.7	L-Head..	Block	Left... Hel'l..	Thermo..	Splash..	.....	Gear....	Single..	At Kent..	Hand..	Muir....	Gravity..	Yes....	Elec....	G. & D....
Partin-Palmer, 38.....	4	3.750x5.250	22.50	231.9	I-Head..	Block	Head... Hel'l..	Thermo..	Splash..	.....	Gear....	Single..	At Kent..	Auto..	Stromberg..	Gravity..	Yes....	Elec....	G. & D....
Paterson, 4-32.....	4	3.500x5.000	19.60	192.4	L-Head..	Block	Left... Hel'l..	Pump...	Spl-Pre...	Piston...	Dual...	Delco...	Hand..	Stromberg..	Gravity..	Yes....	Elec....	Delco...	Delco...	
Paterson, 6-48.....	6	3.500x5.000	29.40	288.6	L-Head..	Pairs..	Left... Hel'l..	Pump...	Spl-Pre...	Piston...	Dual...	Delco...	Hand..	Stromberg..	Vacuum..	Yes....	Elec....	Delco...	Delco...	
Pathfinder.....	6	3.750x5.250	33.75	347.8	L-Head..	Threes	Right.. Hel'l..	Pump...	Spl-Pre...	Gear....	Single..	Wsthse...	Hand..	Schebler..	Gravity..	Yes....	Elec....	Wsthse...	Wsthse...	
Peerless, 54.....	4	3.750x5.000	22.50	220.9	L-Head..	Block	Right.. Hel'l..	Thermo..	Spl-Pre...	Piston...	Single..	At Kent..	H&A...	Stromberg..	Vacuum..	Yes....	Elec....	G. & D....	G. & D....	
Peerless, 55.....	6	3.500x5.000	29.40	288.6	L-Head..	Block	Right.. Hel'l..	Pump...	Spl-Pre...	Piston...	Single..	At Kent..	H&A...	Stromberg..	Vacuum..	Yes....	Elec....	G. & D....	G. & D....	
Peerless, 48.....	6	4.500x6.000	48.60	577.5	T-Head..	Pairs..	Opp... Hel'l..	Pump...	Splash..	.....	Piston...	Dual...	Bosch...	Hand..	Own.....	Pres....	No.....	Elec....	G. & D....

ABBREVIATIONS:—Valve Location: Side and head, S & H.; Left and right, L & R. Camshaft Drive: Helical gears, Hel'l.; Spur gears, Spur. Cooling Circulation: Thermo-siphon, Thermo. Lubrication System: Splash and pressure, Spl-Pre.; Pressure, Pres. Type of Pump: Flywheel, Flwhl.; Rotary, Rot.; Centrifugal, Cent. Ignition System: Double, Doub.; Two-point, 2-Pt. Ignition Make: Westinghouse, Wsthse.; Atwater Kent, At Kent.; Connecticut, Conn. Ignition Control: Automatic, Auto.; Hand and automatic, H&A.; Hand or fixed, H or F. Make of Carburetor: Optional, Opt. Fuel Feed: Pressure-gravity, Pres-Gr. Type of Cranking System: Electric, Elec.; Electric and air, E. & Air. *60-inch tread optional. **Tread more or less than standard except Scripps-Booth, which is optional. ***The Entz system comprising motor and generator replaces the gearbox

Carbureters, Crankers, Magnetos, Etc, for 1915—Continued



Lighting System	TRANSMISSION								RUNNING GEAR				CONTROL		BEARINGS				MAKE AND MODEL	
	Clutch Type	GEARSET			Final Drive	Car Drives Through	Rear Axle	Total Gear Ratio on Direct	Wheel-base	TIRES		Wheels	Rear Springs	Location Steering Wheel	Gearshift Location	Crankshaft Type and No.	Gearset	Rear Axle		Front Wheel
		Type	Location	Forward Sp'ds						Front	Rear									
Waltham	Cone	Sel	Amid	3	Bevel	Springs	Float		126	35x4	35x4	Wood	Ell	Left	Cent	Plain	Ball	Roll	Kissel, 42	
Esterline	Cone	Sel	Unit M.	4	Bevel	Springs	Float	4.00-1	132	36x4	36x4	Wood	Ell	Left	Cent	Plain, 4.	Ball	Roll	Kissel, 6-43	
Esterline	Cone	Sel	Amid	4	Bevel	Springs	Float	3.75-1	142	37x5	37x5	Wood	Ell	Left	Cent	Plain, 4.	Ball	Roll	Kissel, 6-60	
Waltham	Disk	Sel	Unit M.	3	Sp Bev	Springs	Float	3.75-1	123	34x4	34x4	Wood	Ell	Left	Cent	Plain, 4.	B&R	Ball	Kline, 6-42	
Waltham	Disk	Sel	Unit M.	3	Sp Bev	Springs	Float	3.75-1	123	34x4	34x4	Wood	Ell	Left	Cent	Plain, 4.	B&R	Ball	Kline, 6-42 A	
Disco	Disk	Sel	Unit M.	3	Bevel	Tor T	Semi F	4.00-1	108	32x3	32x3	Wood	Ell	Left	Left	Ball, 2.	B&R	Ball	Krit, O	
North E.	Disk	Sel	Unit M.	3	Bevel	Tor T	Semi F	4.00-1	108	32x3	32x3	Wood	Ell	Left	Cent	Ball, 2.	B&R	Ball	Krit, M	
Briggs		Fric	Amid		Chain	Rad Rd.	Semi F		112*	32x3	32x3	Wood	Ell	Left	Cent	Plain, 3.	B&R	Ball	Lambert, 48-C	
Briggs		Fric	Amid		Chain	Rad Rd.	Semi F		117	34x3	34x3	Wood	Ell	Right	Right	Plain, 3.	B&R	Ball	Lambert, 63-C	
Waltham	Cone	Sel	Rear A.	3	Bevel	Tor T	Float	3.30-1	118	34x4	34x4	Wood	Ell	Left	Cent	Plain, 3.	Ball	Ball	Lenox, 4	
Waltham	Cone	Sel	Rear A.	3	Bevel	Tor T	Float	3.07-1	130	34x4	34x4	Opt	Ell	Left	Cent	Plain, 4.	Ball	Ball	Lenox, 6	
Remy	Disk	Sel	Unit M.	3	Bevel	Tor Rd.	Float	3.75-1	135	36x4	36x4	Wood	Ell	Left	Cent	Plain	Ball	Ball	Lewis, 6	
Waltham	Disk	Sel	Unit M.	3	Bevel	Springs	Float	4.00-1	128	34x4	34x4	Wood	Cant	Left	Cent	Plain, 3.	Ball	Ball	Lexington, 6-L	
Jones	Cone	Sel	Unit M.	3	Bevel	Springs	Float		130	36x4	36x4	Wood	Ell	Left	Cent	Plain, 3.	Ball	Roll	Lexington, 6-M	
Waltham	Disk	Sel	Amid	4	Bevel	Rad Rd.	Float	3.50-1	140	37x5	37x5	Opt	Ell	Left	Cent	Plain, 7.	Ball	Roll	Locomobile, M-5	
Waltham	Disk	Sel	Amid	4	Bevel	Rad Rd.	Float	3.80-1	132	36x4	37x5	Opt	Ell	Left	Cent	Plain, 7.	Ball	Roll	Locomobile, R-4	
Jones	Disk	Unit	Unit M.	3	Bevel	Rad Rd.	Float	4.00-1	128	36x4	36x4	Wood	Ell	Left	Cent	Plain, 4.	Ball	B&R	Louverne, 760	
North E.	Disk	Sel	Rear A.	3	Worm	Tor T	Float	3.87-1	130	37x5	37x5	Wood	Ell	Left	Cent	Plain, 5.	Ball	Roll	Lyons-Knight, K-4	
Huff	Cone	Sel	Unit M.	3	Bevel	Tor T	Float	3.58-1	102	30x3	30x3	Wood	Ell	Left	Cent	Plain, 2.	R&P	Roll	M	
Waltham	Cone	Sel	Rear A.	3	Bevel	Tor T	Float	3.58-1	132	36x4	36x4	Wood	Ell	Left	Cent	Plain, 4.	Roll	Roll	McFarlan, 25	
Waltham	Cone	Sel	Rear A.	3	Bevel	Tor T	Float	3.58-1	132	36x4	36x4	Wood	Ell	Left	Cent	Plain, 4.	Roll	Roll	McFarlan, X	
Spfld-Ap	Disk	Sel	Unit M.	3	Bevel	Springs	Semi F	4.00-1	106	30x3	30x3	Wood	Cant	Left	Cent	Plain, 3.	Ball	Ball	McIntyre, 75	
Briggs	Disk	Sel	Unit M.	3	Bevel	Springs	Float	4.00-1	120	35x4	35x4	Wood	Ell	Right	Cent	Plain, 3.	Ball	Ball	McIntyre, 6-40	
Spfld-Ap	Disk	Sel	Unit M.	3	Bevel	Springs	Float	3.70-1	114	34x4	34x4	Wood	Ell	Left	Cent	Plain, 4.	Ball	Roll	Meteor, 42	
Spfld-Ap	Disk	Sel	Unit M.	3	Bevel	Springs	Float	3.70-1	126	35x4	35x4	Wood	Ell	Left	Cent	Plain, 4.	Ball	Roll	Meteor, 43	
G. & D.		Fric	Amid	7	Chain	Rad Rd.	Dead	2.81-1	96	30x3	30x3	Wood	Ell	Left	Cent	Plain, 3.	Ball	Ball	Metz, 22	
Spfld-Ap	Cone	Sel	Rear A.	3	Bevel	Springs	Float	4.00-1	116	34x4	34x4	Wood	Ell	Left	Cent	Plain, 3.	B&R	Roll	Mitchell-Lewis, 4	
Spfld-Ap	Cone	Sel	Rear A.	3	Bevel	Springs	Float	4.00-1	127	36x4	36x4	Wood	Ell	Left	Cent	Plain, 4.	B&R	Roll	Mitchell-Lewis, 6	
Remy	Cone	Sel	Amid	3	Bevel	Tor T	Float	3.35-1	144	37x5	37x5	Wood	Ell	Left	Cent	Plain, 4.	Ball	Roll	Mitchell-Lewis, 7-6	
Remy	Cone	Sel	Amid	3	Bevel	Tor T	Float	3.35-1	132	36x4	36x4	Wood	Ell	Left	Cent	Plain, 4.	Ball	Roll	Mitchell-Lewis, 5-6	
Wagner	Cone	Sel	Amid	4	Bevel	Tor T	Float		128	36x4	36x4	Opt	S-E	Left	Cent	Plain, 3.	Ball	B&R	Moline-Knight	
Bosch	Cone	Sel	Amid	3	Sp Bev	Springs	Float		132**	36x4	36x4	Wood	Ell	Left	Cent	Plain, 7.	Ball	Roll	Marmon, 41	
Bosch	Disk	Sel	Rear A.	3	Bevel	Tor T	Float	3.46-1	145	36x4	37x5	Wood	Ell	Left	Cent	Plain, 7.	Ball	B&R	Marmon, 43	
Rob-Myr	Cone	Sel	Unit M.	3	Bevel	Rad Rd.	Float	4.00-1	125	33x4	33x4	Wood	Ell	Left	Cent	Plain, 3.	Ball	B&R	Monarch, 6	
Delco	Disk	Sel	Unit M.	3	Bevel	Springs	Float	4.00-1	122	34x4	34x4	Wood	Ell	Left	Left	Plain, 3.	Roll	Ball	Moon, 4-38	
Delco	Disk	Sel	Unit M.	3	Bevel	Springs	Float	4.00-1	122	34x4	34x4	Wood	Ell	Left	Cent	Plain, 3.	Roll	Ball	Moon, 6-40	
G. & D.	Disk	Sel	Amid	4	Bevel	Tor T	Semi F	3.00-1	127	36x4	36x4	Wood	Ell	Right	Cent	Plain, 5.	Ball	Ball	Morse, D-4	
Remy	Cone	Sel	Amid	3	Bevel	Springs	Float	4.00-1	132	36x4	36x4	Wood	Cant	Left	Cent	Plain, 4.	Ball	Roll	N	
G. & D.	Disk	Sel	Unit M.	4	Bevel	Springs	Semi F	4.08-1	131	37x4	37x4	Wood	S-E	Left	Cent	Plain, 4.	Ball	Roll	Norwalk, F	
Delco	Cone	Sel	Unit M.	3	Bevel	Springs	Float	4.00-1	112	33x4	33x4	Wood	Ell	Left	Cent	Plain, 3.	Roll	B&R	Oakland, 37	
Delco	Cone	Sel	Unit M.	3	Bevel	Springs	Float	4.00-1	123	35x4	35x4	Wood	Ell	Left	Cent	Plain, 4.	Ball	B&R	Oakland, 49	
Delco	Cone	Sel	Unit M.	3	Bevel	Springs	Float	4.00-1	112	33x4	33x4	Wood	Ell	Left	Cent	Plain, 3.	B&R	Roll	Oldsmobile, 42	
Delco	Cone	Sel	Unit M.	3	Bevel	Springs	Float	4.00-1	139	36x5	36x5	Wood	Ell	Left	Cent	Plain, 4.	B&R	Roll	Oldsmobile, 55	
Auto-lite	Cone	Sel	Rear A.	3	Bevel	Tor T	Float	3.75-1	114	34x4	34x4	Wood	Ell	Left	Cent	Plain, 5.	Ball	Roll	Overland, 80	
Auto-lite	Cone	Sel	Rear A.	3	Bevel	Tor T	Float	3.75-1	106	33x4	33x4	Wood	Ell	Left	Cent	Plain, 5.	Ball	Roll	Overland, 81	
Auto-lite	Cone	Sel	Rear A.	3	Bevel	Tor T	Float	4.00-1	125	35x4	35x4	Wood	Ell	Left	Cent	Plain, 3.	Ball	Roll	Overland, 82	
Owa	Elec	El***	Amid		Bevel		Float	3.00-1	136	35x5	35x5	Opt	S-E	Left	Cent	Plain, 3.		Roll	Owen	
Bijur	Disk	Prog	Rear A.	3	Sp Bev	Rad Rd.	Non-F	3.93-1	140	36x4	37x5	Wood	Ell	Left	Left	Plain, 7.	Ball	Roll	P	
Bijur	Disk	Prog	Rear A.	3	Sp Bev	Rad Rd.	Non-F	3.93-1	144	37x5	37x5	Wood	Ell	Left	Left	Plain, 7.	Ball	Roll	Packard, 3-38	
G. & D.	Disk	Sel	Unit M.	3	Bevel	Springs	Float	4.07-1	124	34x4	34x4	Wood	Cant	Left	Cent	Plain, 3.	Ball	B&R	Packard, 5-48	
G. & D.	Disk	Sel	Rear A.	3	Bevel	Tor T	Float	4.20-1	96	28x3	23x3	Wood	Ell	Left	Cent	Plain, 2.	Roll	Roll	Paige-Detroit, 6	
G. & D.	Cone	Sel	Rear A.	3	Bevel	Tor T	Float	3.75-1	115	33x4	33x4	Wood	Ell	Left	Cent	Plain, 3.	Roll	Roll	Partin-Palmer, 20	
Delco	Cone	Sel	Unit M.	3	Bevel	Springs	Float	4.00-1	112	33x4	33x4	Wood	Ell	Left	Cent	Plain, 3.	Ball	B&R	Partin-Palmer, 38	
Delco	Cone	Sel	Unit M.	3	Bevel	Springs	Float	3.75-1	124	34x4	34x4	Wood	Ell	Left	Cent	Plain, 4.	Ball	B&R	Paterson, 4-32	
Waltham	Disk	Sel	Unit M.	4	Bevel	Tor T	Float	3.75-1	125	34x4	34x4	Wood	Cant	Left	Cent	Plain, 3.	Ball	Roll	Paterson, 6-48	
Waltham	Disk	Sel	Unit M.	4	Bevel	Tor T	Float	3.75-1	125	34x4	34x4	Wood	Cant	Left	Cent	Plain, 3.	Ball	Roll	Pathfinder	
G. & D.	Disk	Sel	Unit M.	3	Sp Bev	Springs	Semi F	4.50-1	113	34x4	34x4	Wood	Plat	Left	Cent	Plain, 3.	B&R	Roll	Peerless, 54	
G. & D.	Disk	Sel	Unit M.	3	Sp Bev	Springs	Semi F	4.00-1	121	34x4	34x4	Wood	Plat	Left	Cent	Plain, 3.	B&R	Roll	Peerless, 55	
G. & D.	Exp Bd	Sel	Amid	4	Sp Bev	Rad Rd.	Float	3.35-1	137	37x5	37x5	Wood	Plat	Opt	Opt	Plain, 7.	Ball	Roll	Peerless, 48	

ABBREVIATIONS:—Make of Cranking System: North East, North-E.; Gray & Davis, G. & D.; Ward Leonard, Ward L.; Bosch-Rushmore, Bosch-R.; Allis-Chalmers, Allis-C.; Leece-Neville, Leece-Nev.; Splitdorf-Apple, Spfld-Ap.; Entz-Dyneto, Entz-Dyn.; Robbins & Meyers, Rob-Myr.; Hendricks, Hendrix. Clutch Type: Contracting band, Con Bd.; Expanding band, Exp Bd. Gearset Type: Selective, Sel.; Progressive, Prog.; Frictional, Fric.; Planetary, Plan. Gearset Location: Unit with motor, Unit M.; Amidships, Amid; Rear Axle, Rear A. Final Drive: Spiral bevel, Sp Bev. Car Drives Through: Radius rod, Rad Rd.; Torsion tube, Tor T.; Torsion arm, Tor A. Rear Axle: Floating, Float; Semi-floating, Semi F.; floating, float; Non-floating, Non-Float. Rear Springs: elliptic, Ell.; Elliptic, Ell.; Cantilever, Cant.; Semi-elliptic, Semi E.; Platform, Plat. Control: Center, Cent. Bearings: Roller, Roll.; Ball and roller, B&R.; Plain and ball, Pl&B.; Plain and roller, Pl&R.



Specifications of American Passenger Cars, Including Horsepower

MAKE AND MODEL	No. of Cylinders	Bore and Stroke, Inches	S. A. E. H. P.	Piston Displacement Cubic Inches	CYLINDERS		Valve Location	Camshaft Drive	Cooling Circulation	LUBRICATION		IGNITION			CARBURETION			CRANKING SYSTEM	
					Shape	How Cast				System	Type of Pump	System	Make	Control	Make of Carburetor	Fuel Feed	Is Hot Air Pipe Fitted?	Type	Make
Peter Pan	4	2.750x4.125	12.03	392.9	L-Head	Block	Head		Thermo			Single	Berling	Hand				Mech'l.	
Pierce-Arrow, 38	6	4.000x5.500	38.40	414.7	T-Head	Pairs	Opp.	Hel'l.	Pump	Pres.	Gear	Doub.	Bosch	Hand	Own	Pres.	Yes	Elec.	Wathse
Pierce-Arrow, 48	6	4.500x5.500	48.60	529.8	T-Head	Pairs	Opp.	Hel'l.	Pump	Pres.	Gear	Doub.	Bosch	Hand	Own	Pres.	Yes	Elec.	Wathse
Pierce-Arrow, 66	6	5.000x7.000	60.00	824.8	T-Head	Pairs	Opp.	Spur	Pump	Pres.	Gear	Doub.	Bosch	Hand	Own	Pres.	Yes	Elec.	Wathse
Pilot, 55	6	3.500x5.250	29.40	303.1	T-Head	Block	Opp.	Hel'l.	Pump	Splash		Single		Hand	Schebler	Gravity	Yes	Elec.	Wathse
Pilot, 75	6	4.500x6.000	32.40	331.7	T-Head	Block	Opp.	Hel'l.	Pump	Splash		Single		Hand	Opt.	Pres.	Yes	Elec.	Wathse
Pratt, 4-40	4	4.125x5.250	27.25	280.6	L-Head	Block	Left	Hel'l.	Pump	Spl-Press	Piston	Dual	At Kent	Auto	Rayfield	Gravity	Yes	Elec.	G. & D.
Pratt, 6-50	6	3.750x5.250	33.75	347.8	L-Head	Threes	Right	Hel'l.	Pump	Spl-Press	Piston	Dual	At Kent	Auto	Rayfield	Gravity	Yes	Elec.	G. & D.
Premier-Weidely, A	6	3.625x5.250	31.57	234.8	L-Head	Block	Head	Hel'l.	Pump	Spl-Press	Gear	Single	Eisemann	Hand	Rayfield	Vacuum	Yes	Elec.	Remy
Pullman-Junior	4	3.750x4.250	22.50	187.7	L-Head	Block	Left	Chain	Thermo	Spl-Press	Piston	Single		Hand		Gravity	Yes	Elec.	Spdlf-Ap
Pullman, 6-48	6	3.750x5.250	33.75	347.8	L-Head	Threes	Right	Hel'l.	Pump	Spl-Press	Gear	Dual		Hand		Gravity	Yes	Elec.	Wathse
R																			
Rayfield, 20	4	2.750x4.500	12.03	106.4	L-Head	Block	Right	Spur	Thermo	Spl-Press	Gear	Single		Hand	Rayfield	Gravity	Yes	None	
R-C-H, K	4	3.250x5.000	25.39	165.9	L-Head	Block	Left	Spur	Thermo	Splash	Cent	Single	Bosch	Fixed	B-D	Gravity	Yes	Elec.	Ward L.
Regal, D	4	3.750x5.000	22.50	220.9	L-Head	Block	Left	Hel'l.	Thermo	Splash	Piston	Dual	At Kent	Auto	Stewart	Gravity	Yes	Elec.	Bosch R.
Remington	4	2.750x4.500	12.03	106.4	L-Head	Block	Right	Spur	Thermo	Spl-Press	Piston	Single	At Kent	Auto	Mayer	Gravity	No	Elec.	Ward L.
Reo, R	4	4.125x4.500	27.20	240.5	L-Head	Pairs	S&H	Hel'l.	Pump	Splash	Piston	Dual	Remy	Hand	Holley	Gravity	Yes	Elec.	Remy
Reo, ST	4	4.125x4.500	27.20	240.5	L-Head	Pairs	S&H	Hel'l.	Pump	Splash	Piston	Dual	Remy	Hand	Holley	Gravity	Yes	Elec.	Remy
Reo, M	6	3.562x5.125	30.51	306.6	L-Head	Threes	S&H	Hel'l.	Pump	Splash	Piston	Dual	Remy	Hand	Johnson	Gravity	Yes	Elec.	Remy
Republic, E	6	4.250x5.000	43.80	425.6	T-Head	Pairs	Opp.	Spur	Pump	Pres.	Gear	Dual	Delco	Hand	Rayfield	Vacuum	Yes	Elec.	Delco
S																			
Saxon, A	4	2.625x4.000	11.00	87.4	L-Head	Block	Left	Hel'l.	Thermo	Splash	Vacuum	Single	At Kent	Auto	Mayer	Gravity	Yes		
Saxon, B	6	2.875x4.500	20.00	175.3	L-Head	Block	Right	Hel'l.	Thermo	Splash	Piston	Single	At Kent	Auto		Gravity			
Scripps-Booth, C	4	2.875x4.000	13.37	103.6	L-Head	Block	Head	Hel'l.	Thermo	Splash	Piston	Single	At Kent	Auto	Zenith	Gravity	Yes	Elec.	Bijur
S-G-V, J	4	3.875x4.375	24.22	206.4	L-Head	Block	Right	Chain	Pump	Pres.	Gear	Single	Bosch	Hand	Zenith	Pres.	Yes	Elec.	Ward L.
Simplex, 38	4	4.875x6.500	38.00	485.3	T-Head	Pairs	Opp.	Spur	Pump	Splash	Gear	Dual	Bosch	Hand	Newcomb	Pres.	No	Elec.	Bosch R.
Simplex, 50	4	5.375x6.500	46.00	590.0	T-Head	Pairs	Opp.	Spur	Pump	Splash	Gear	Dual	Bosch	Hand	Newcomb	Pres.	No	Elec.	Bosch R.
Singer, 6	6	4.000x5.500	33.40	414.7	T-Head	Threes	Opp.	Hel'l.	Pump	Spl-Press	Gear	Dual	Eisemann	Hand	C.R.G.	Pres.	No	Elec.	Wathse
Spaulding	4	4.250x5.500	28.90	321.0	L-Head	Block	Right	Hel'l.	Pump	Spl-Press	Piston	Dual	Simms	Hand	Rayfield	Gravity	Yes	Elec.	Entz
Speedwell, I	6	4.125x5.250	40.90	420.9	Dome	Threes	Rot		Pump	Spl-Press	Gear	Single	Wathse	Hand	Schebler	Vacuum	Yes	Elec.	Wathse
Sphinx, A-15	4	3.375x5.000	18.21	178.9	L-Head	Block	Right	Hel'l.	Thermo	Splash	Piston	Single	Splitdorf	Hand	Muir	Gravity	Yes	Elec.	Spdlf-Ap
Stearns, 4	4	3.750x5.625	22.50	248.5	Knight	Block	Sleeve	Chain	Pump	Pres.	Gear	Single	Bosch	Hand		Gravity	Yes	Elec.	G. & D.
Stearns, Big 4	4	4.250x5.500	25.90	312.0	Knight	Pairs	Sleeve	Chain	Pump	Splash	Gear	Dual	Bosch	Hand	Stromberg	Pres.	Yes	Elec.	G. & D.
Stearns, 6	6	4.375x5.750	43.80	489.4	Knight	Pairs	Sleeve	Chain	Pump	Spl-Press	Gear	Dual	Bosch	Hand	Stromberg	Pres.	Yes	Elec.	G. & D.
Stevens-Duryea, D-6	6	4.375x5.500	46.00	496.1	L-Head	Pairs	Right	Hel'l.	Pump	Spl-Press	Piston	Doub	Bosch	Hand	Own	Gravity	Yes	Elec.	Delco
Stevens-Duryea, DD-6	6	4.437x5.500	47.30	510.4	L-Head	Pairs	Right	Hel'l.	Pump	Spl-Press	Piston	Doub	Bosch	Hand	Own	Gravity	Yes	Elec.	Delco
Studebaker, 4 S D	4	3.500x5.000	19.60	192.4	L-Head	Block	Left	Hel'l.	Pump	Splash	Piston	Single	Remy	Hand	Schebler	Gravity	No	Elec.	Wagner
Studebaker, 6	6	3.500x5.000	29.40	288.6	L-Head	Block	Left	Hel'l.	Pump	Splash	Piston	Single	Remy	Hand	Schebler	Gravity	Yes	Elec.	Wagner
Stutz, H.C.S.	4	3.750x5.000	22.50	221.0	L-Head	Block	Right	Spur	Thermo	Pres	Gear	Dual	Remy	Hand	Stromberg	Gravity	Yes	Elec.	Remy
Stutz, 40	4	4.750x5.000	36.10	389.9	T-Head	Pairs	Opp	Spur	Pump	Pres	Gear	Dual	Bosch	Hand	Stromberg	Gravity	Yes	Elec.	Remy
Stutz, 40	4	4.750x5.500	36.10	389.9	T-Head	Pairs	Opp	Spur	Pump	Pres	Gear	Dual	Eisemann	Hand	Stromberg	Pres	Yes	Elec.	Remy
Stutz, 6	6	4.000x5.000	38.40	376.9	T-Head	Threes	Opp	Spur	Pump	Pres	Gear	Single	Eisemann	Hand	Stromberg	Gravity	Yes	Elec.	Remy
Stutz, 6	6	4.000x5.000	38.40	376.9	T-Head	Threes	Opp	Spur	Pump	Pres	Gear	Single	Eisemann	Hand	Stromberg	Gravity	Yes	Elec.	Remy
T																			
Touraine, 12	6	4.000x5.500	38.40	414.7	T-Head	Threes	Opp	Hel'l.	Pump	Spl-Press	Gear	Dual	Simms	Hand	Zenith	Pres	Yes	Elec.	Wathse
Touraine, 12	6	4.000x5.500	38.40	414.7	T-Head	Threes	Opp	Hel'l.	Pump	Spl-Press	Gear	Dual	Simms	Hand	Zenith	Pres	Yes	Elec.	Wathse
Trumbull, 15 A	4	2.875x4.000	26.74	103.6	2-cycle	Block	Right	Hel'l.	Thermo	Spl-Press	Piston	Single	Splitdorf	Fixed	Zephyr	Gravity	Yes	Elec.	Ward L.
Twombly	4	3.125x4.000	15.64	122.7	L-Head	Block	Left	Hel'l.	Thermo	Splash	Piston	Single	Splitdorf	Hand	Opt.	Gravity	Yes	Opt	Opt
V																			
Velie, 12	4	4.625x5.250	34.25	352.8	L-Head	Pairs	Left	Chain	Pump	Splash	Piston	Dual	Bosch	Hand	Stromberg	Gravity	Yes	Elec.	G. & D.
Velie, 14	6	3.750x5.250	33.75	347.8	L-Head	Threes	Right	Hel'l.	Pump	Splash	Gear	Dual	Bosch	Hand	Stromberg	Pres	Yes	Elec.	G. & D.
Velie, 15	6	3.500x5.000	29.40	288.6	L-Head	Block	Right	Hel'l.	Pump	Spl-Press	Piston	Dup	At Kent	Auto	Stromberg	Gravity	Yes	Elec.	G. & D.
Vixen, S-B	4	2.750x4.000	12.03	95.0	L-Head	Block	Left	Spur	Thermo	Splash	Cent	Single	At Kent	Hand	Zephyr	Gravity	Yes	None	
Vulcan, 35	4	3.500x5.125	19.60	197.2	L-Head	Block	Right	Spur	Pump	Spl-Press	Gear	Single	Wathse	Hand		Gravity		Elec.	Wathse
W																			
Westcott, O	4	3.500x5.000	19.60	192.4	L-Head	Block	Left	Hel'l.	Pump	Splash	Piston	Dual	Delco	Auto				Elec.	Delco
Westcott, U	6	3.500x5.000	29.40	288.6	L-Head	Block	Left	Hel'l.	Pump	Splash	Piston	Dual	Delco	Auto				Elec.	Delco
White, 30	4	3.750x5.125	22.50	226.4	L-Head	Block	Right	Hel'l.	Pump	Spl-Press	Gear	Single	Bosch	Hand	Own	Vacuum	Yes	Elec.	Ents
White, 45	4	4.250x6.375	29.00	361.7	L-Head	Block	Right	Hel'l.	Pump	Spl-Press	Gear	Single	Bosch	Hand	Own	Vacuum	Yes	Elec.	Ents
White, 60	6	4.250x5.750	43.80	489.4	L-Head	Block	Right	Hel'l.	Pump	Spl-Press	Gear	Single	Bosch	Hand	Own	Vacuum	Yes	Elec.	Ents
Willys-Knight, K-19	4	4.000x5.500	25.60	251.3	Knight	Pairs	Sleeve	Chain	Pump	Pres	Piston	Single	Simms	Hand	Zenith	Pres	Yes	Elec.	U.S.L.
Winton, 21	6	4.500x5.500	48.60	529.8	L-Head	Pairs	Right	Hel'l.	Pump	Pres	Piston	Dual	Bosch	Hand	Rayfield	Pres	Yes	Opt	

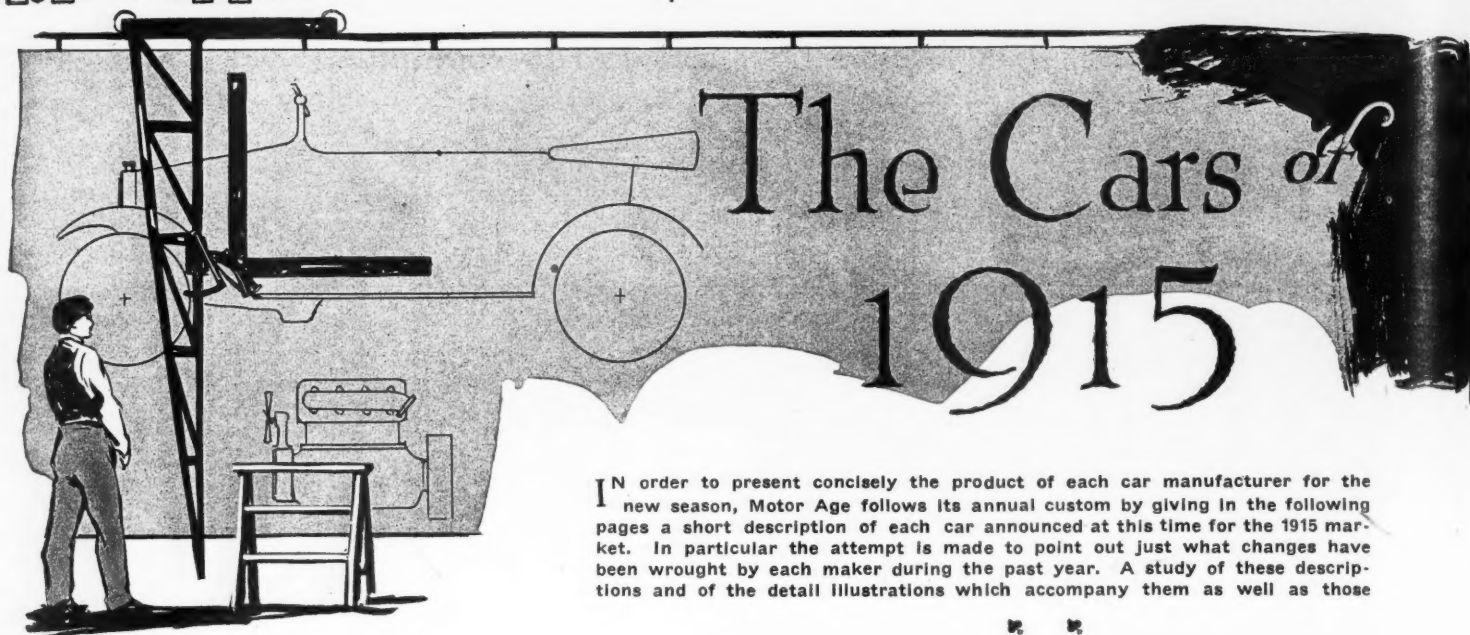
ABBREVIATIONS:—Valve Location: Side and head, S & H.; Left and right, L & R. Camshaft Drive: Helical gears, Hel'l.; Spur gears, Spur. Cooling Circulation: Thermo-siphon, Thermo. Lubrication System: Splash and pressure, Spl-Press; Pressure, Pres. Type of Pump: Flywheel, Flwhl.; Rotary, Rot.; Centrifugal, Cent. Ignition System: Double, Doub.; Two-point, 2-Pt. Ignition Make: Westinghouse, Wathse.; Atwater Kent, At Kent.; Connecticut, Conn. Ignition Control: Automatic, Auto.; Hand and automatic, H&A.; Hand or fixed, H or F. Make of Carburetor: Optional, Opt. Fuel Feed: Pressure-gravity, Pres.-Gr. Type of Cranking System: Electric, Elec.; Electric and air, E. & Air. *60-inch tread optional. **Tread more or less than standard except Scripps-Booth, which is optional.

Carbureters, Crankers, Magnets, Etc. for 1915—Continued



Lighting System	TRANSMISSION								RUNNING GEAR				CONTROL		BEARINGS				MAKE AND MODEL	
	Clutch Type	GEARSET			Final Drive	Car Drives Through	Rear Axle	Total Gear Ratio on Direct	Wheel base	TIRES		Wheels	Rear Springs	Location Steering Wheel	Gearshift Location	Crankshaft Type and No.	Gearset	Rear Axle		Front Wheel
		Type	Location	Forward Sp'ds						Front	Rear									
	Disk	Sel		3	Bevel				110	29x3½	29x3½	Wood	Cant.	Left	Cent.				Peter Pan	
Wethse	Cone	Sel	Amid	4	Bevel	Springs	Semi F	3.78-1	134	36x4½	36x4½	Wood	Ell	Right	Right	Plain, 7.	Ball	B&R	Pierce-Arrow, 38	
Wethse	Cone	Sel	Amid	4	Bevel	Springs	Semi F	3.53-1	142	37x5	37x5	Wood	Ell	Right	Right	Plain, 7.	Ball	B&R	Pierce-Arrow, 48	
Wethse	Cone	Sel	Amid	4	Bevel	Springs	Semi F	2.88-1	147½	37x5	38x5½	Wood	Ell	Right	Right	Plain, 7.	Ball	B&R	Pierce-Arrow, 66	
Wethse	Cone	Sel	Unit M	3	Bevel	Springs	Float	4.00-1	126	34x4	34x4	Wood	Cant.	Left	Cent.	Plain, 3.	Ball	Ball	Pilot, 55	
Wethse	Cone	Sel	Amid	3	Bevel	Springs	Float	3.60-1	132	37x4½	37x4½	Wood	S-E	Opt.	Cent.	Plain, 3.	Roll	Roll	Pilot, 75	
G. & D	Disk	Sel	Unit M	4	Bevel	Springs	Float	3.91-1	122	34x4	34x4	Wood	Ell	Left	Cent.	Plain, 3.	Roll	Roll	Pratt, 4-40	
G. & D	Disk	Sel	Unit M	4	Bevel	Springs	Float	3.93-1	112	36x4½	36x5½	Wood	Ell	Left	Left	Plain, 3.	Roll	Roll	Pratt, 6-50	
Remy	Disk	Sel	Unit M	3	Bevel	Springs	Float	3.87-1	132	36x4½	36x4½	Wood	S-E	Left	Cent.	Plain, 4.	Roll	B&R	Premier-Weidely, A	
Spdlf-Ap	Disk	Sel	Unit M	3	Bevel	Tor T	Float	4.00-1	110	30x3½	30x3½	Wood	Cant.	Left	Cent.	Plain, 3.	Ball	Roll	Pullman-Junior	
Wethse	Disk	Sel	Unit M	4	Bevel	Tor Rd	Float	3.90-1	134	36x4½	36x4½	Wire	Ell	Left	Cent.	Plain, 3.	Ball	Roll	Pullman, 6-48	
	Disk	Sel	Unit M	3	Bevel	Rad Rd	Semi F	3.75-1	96	28x3	28x3	Wire	S-E	Left	Cent.	Plain, 2.	Ball	Ball	R Rayfield, 20	
Ward L	Cone	Sel	Rear A	3	Bevel	Rad Rd	Semi F	4.00-1	110	32x3½	32x3½	Wood	Ell	Opt	Cent.	Plain, 2.	Plain	Roll	R-C-H, K	
Bosch R	Cone	Sel	Rear A	3	Bevel	Rad Rd	Float	3.75-1	112	32x3½	32x3½	Wood	S-E	Opt	Cent.	Plain, 3.	Roll	Roll	Regal, D	
Ward L	Cone	Sel	Unit M	3	Bevel	Springs	Float	4.00-1	105	28x3	28x3	Wood	Ell	Left	Cent.	Plain, 2.	Ball	Ball	Remington	
Remy	Disk	Sel	Amid	3	Bevel	Springs	Semi F	4.00-1	115	34x4	34x4	Wood	Ell	Left	Cent.	Plain, 3.	Roll	Roll	Reo, R	
Remy	Disk	Sel	Amid	3	Bevel	Springs	Semi F	4.00-1	112	34x4	34x4	Wood	Ell	Left	Cent.	Plain, 3.	Roll	Roll	Reo, ST	
Remy	Disk	Sel	Amid	3	Sp Bev	Springs	Float	3.70-1	122	34x4	34x4	Wood	S-E	Left	Cent.	Plain, 4.	Roll	Roll	Reo, M	
Delco	Cone	Sel	Amid	4	Bevel	Rad Rd	Float	4.00-1	133	36x4½	36x4½	Wood	Ell	Left	Cent.	Plain, 4.	Ball	Ball	Republic, E	
	Disk	Prog	Rear A	2	Bevel	Tor T	Semi F	4.40-1	96**	28x3	28x3	Wire	Ell	Left	Cent.	Plain, 2.	Pl&R	Ball	S Saxon, A	
	Disk	Sel	Rear A	3	Bevel	Tor T	Semi F	4.50-1	112			Wood	Ell	Left	Cent.	Plain, 3.	Roll	Roll	Saxon, B	
Bijur	Cone	Sel	Unit M	3	Bevel	Springs	Float	4.00-1	110**	30x3½	30x3½	Wire	Cant.	Left	Cent.	Plain, 2.	Ball	Ball	Scripps-Booth, C	
Ward L	Disk	Sel	Amid	4	Bevel	Springs	Semi F	4.00-1	118	34x4	34x4	Wood	Ell	Left	Cent.	Plain, 3.	Ball	Ball	S.G.V., J	
Bosch R	Disk	Sel	Amid	4	Bevel	Tor T	Semi F	2.75-1	137	36x4½	37x5	Wood	Ell	Right	Right	Plain, 3.	Ball	Ball	Simplex, 38	
Bosch R	Disk	Sel	Amid	4	Chain	Rad Rd	Dead	2.13-1	137**	36x4½	37x5	Wood	S-E	Right	Right	Plain, 3.	Ball	Ball	Simplex, 50	
Wethse	Disk	Sel	Unit M	4	Sp Bev	Springs	Float	3.77-1	135	36x4½	36x4½	Opt	Cant.	Left	Cent.	Plain, 3.	Roll	Roll	Singer, 6	
Entz	Cone	Sel	Amid	3	Bevel	Springs	Float	3.75-1	120	36x4	36x4	Wood	Ell	Left	Cent.	Plain, 3.	Ball	Roll	Spaulding	
Wethse	Disk	Sel	Unit M	3	Sp Bev	Springs	Float	4.03-1	135	37x5	37x5	Wood	Ell	Left	Cent.	Plain, 3.	Roll	Roll	Speedwell, I	
Spdlf-Ap	Cone	Sel	Rear A	3	Bevel	Springs	Semi F	4.00-1	112	30x3½	30x3½	Wood	Cant.	Left	Cent.	Plain, 2.	Roll	Roll	Sphinx, A-15	
G. & D	Cone	Sel	Unit M	3	Bevel	Springs	Semi F	4.00-1	119	34x4	34x4	Wood	Cant.	Left	Cent.	Plain, 3.	B&R	B&R	Stearns, 4	
G. & D	Disk	Sel	Unit M	3	Bevel	Springs	Float	3.90-1	121	36x4½	36x4½	Wood	Ell	Left	Cent.	Plain, 5.	Ball	Roll	Stearns, Big 4	
G. & D	Disk	Sel	Unit M	4	Sp Bev	Springs	Float	3.50-1	140	37x5	37x5	Wood	Ell	Left	Cent.	Plain, 7.	Ball	Roll	Stearns, 6	
Delco	Disk	Prog	Unit M	3	Bevel	Springs	Float	3.62-1	131	37x4½	37x4½	Wood	Ell	Left	Left	Plain, 4.	Ball	Ball	Stevens-Duryea, D-6	
Delco	Disk	Prog	Unit M	3	Bevel	Springs	Float	3.62-1	138	37x5	37x5	Wood	Ell	Left	Left	Plain, 4.	Ball	Ball	Stevens-Duryea, DD-6	
Wagner	Cone	Sel	Rear A	3	Bevel	Rad Rd	Float	4.00-1	108*	33x4	33x4	Wood	Ell	Left	Cent.	Plain, 3.	Pl&R	Roll	Studebaker, 4-SD	
Wagner	Cone	Sel	Rear A	3	Bevel	Rad Rd	Float	3.70-1	121	34x4	34x4	Wood	Ell	Left	Cent.	Plain, 4.	Pl&R	Roll	Studebaker, 6	
Remy	Cone	Sel	Rear A	3	Bevel	Tor T	Semi F	4.00-1	108	32x4	32x4	Wood	S-E	Right	Right	Plain, 3.	Ball	Ball	Stutz, H-C-8	
Remy	Cone	Sel	Rear A	3	Bevel	Tor T	Semi F	3.50-1	120	34x4½	34x4½	Wood	S-E	Right	Right	Plain, 3.	Ball	B&R	Stutz, 40	
Remy	Cone	Sel	Rear A	3	Bevel	Tor T	Semi E	3.50-1	130	34x4½	34x4½	Wood	S-E	Right	Right	Plain, 3.	Ball	B&R	Stutz, 40	
Remy	Cone	Sel	Rear A	3	Bevel	Tor T	Semi F	3.50-1	120	34x4½	34x4½	Wood	S-E	Right	Right	Plain, 3.	Ball	B&R	Stutz, 6	
Remy	Cone	Sel	Rear A	3	Bevel	Tor T	Semi F	3.50-1	130	34x4½	34x4½	Wood	S-E	Right	Right	Plain, 3.	Ball	B&R	Stutz, 6	
Wethse	Disk	Sel	Unit M	4	Bevel	Tor T	Float	3.50-1	124	34x4½	34x4½	Wood	Ell	Left	Cent.	Plain, 3.	Ball	Roll	Touraine, 12	
Wethse	Disk	Sel	Unit M	4	Bevel	Tor T	Float	3.50-1	134	34x4½	34x4½	Wood	Ell	Left	Cent.	Plain, 3.	Ball	Roll	Touraine, 12	
Ward L	Cone	Sel	Rear A	3	Bevel	Tor T	Semi F	3.60-1	80**	28x3	28x3	Wire	Cant.	Opt	Cent.	Plain, 2.	B&R	B&R	Trumbull, 15 A	
Opt	Cone	Sel	Rear A	3	Worm	Tor T	Semi F	4.00-1	100**	30x3½	30x3½	Wire	Cant.	Left	Cent.	Plain, 2.	Ball	Roll	Twombly	
G. & D	Disk	Sel	Amid	4	Bevel	Springs	Float	3.93-1	121	37x4½	37x4½	Wood	Ell	Left	Cent.	Plain, 3.	Ball	Roll	Vehle, 12	
G. & D	Disk	Sel	Amid	4	Bevel	Springs	Float	3.93-1	126	37x4½	37x4½	Wood	Ell	Left	Cent.	Plain, 3.	Ball	Roll	Vehle, 14	
G. & D	Cone	Sel	Unit M	4	Bevel	Springs	Semi F	4.03-1	124	34x4	34x4	Wood	Ell	Left	Cent.	Plain, 3.	Ball	Roll	Vehle, 15	
Hendrix	Disk	Sel	Amid	3	Bevel		Float		120	32x3½	32x3½	Wood	Cant.	Left	Cent.	Plain, 3.	Ball		Vulcan, 35	
Wethse	Fric	Sel	Rear A		Chain	Springs	None	4.00-1	106**	28x3	28x3	Wire	Coil	Right	Right	Plain, 2.	Ball	Ball	Vixen, S-B	
Delco	Cone	Sel	Unit M	3	Bevel	Springs	Float	4.00-1	113*	33x4	33x4	Wood	Ell	Left	Cent.	Plain, 3.	B&R	B&R	Westcott, W	
Delco	Cone	Sel	Unit M	3	Bevel	Springs	Float	3.77-1	125*	35x4½	35x4½	Wood	Cant.	Left	Cent.	Plain, 4.	B&R	Roll	Westcott, U	
Entz	Disk	Sel	Amid	4	Bevel	Rad Rd	Float	3.92-1	115	32x4	32x4	Wood	Ell	Left	Cent.	Ball, 2.	Ball	Ball	White, 30	
Entz	Disk	Sel	Amid	4	Bevel	Rad Rd	Float	3.40-1	132½	36x4½	36x4½	Wood	Ell	Left	Cent.	Pl&B, 3.	Ball	Ball	White, 45	
Entz	Disk	Sel	Amid	4	Bevel	Rad Rd	Float	3.40-1	140½	37x5	37x5	Wood	Ell	Left	Cent.	Pl&B, 3.	Ball	Ball	White, 60	
U. S. L	Cone	Sel	Amid	4	Bevel	Rad Rd	Float	4.83-1	120	36x4½	36x4½	Wire	Cant.	Left	Cent.	Plain, 5.	Ball	Roll	Willys-Knight K19	
Opt	Disk	Sel	Amid	4	Bevel	Springs	Float	3.92-1	136	37x5	37x5	Wood	Ell	Left	Cent.	Plain, 4.	Ball	Roll	Winton 21	

ABBREVIATIONS:—Make of Cranking System: North East, North-E.; Gray & Davis, G. & D.; Ward Leonard, Ward L.; Bosch-Rushmore, Bosch-R.; Allis-Chalmers, Allis-C.; Leeco-Neville, Leeco-Nev.; Spldlf-Apple, Spldlf-Ap.; Entz-Dyneto, Entz-Dyn.; Robbins & Meyers, Rob-Myr.; Hendrix, Hendrix. Clutch Type: Contracting band, Con Bd.; Expanding band, Exp Bd. Gearset Type: Selective, Sel.; Progressive, Prog.; Frictional, Fric.; Planetary, Plan. Gearset Location: Unit with motor, Unit M.; Amidships, Amid.; Rear Axle, Rear A. Final Drive: Spiral bevel, Sp Bev. Car Drives Through: Radius rod, Rad Rd.; Torsion tube, Tor T.; Torsion arm, Tor A. Rear Axle: Floating, Float.; Semi-floating, Semi F.; ½ floating, ½ Float.; Non-floating, Non-Float. Rear Springs: ½ elliptic, ½ Ell.; Elliptic, Ell.; Cantilever, Cant.; Semi-elliptic, Semi E.; Platform, Plat. Control: Center, Cent. Bearings: Roller, Roll.; Ball and roller, B&R.; Plain and ball, Pl&B.; Plain and roller, Pl&R.



IN order to present concisely the product of each car manufacturer for the new season, Motor Age follows its annual custom by giving in the following pages a short description of each car announced at this time for the 1915 market. In particular the attempt is made to point out just what changes have been wrought by each maker during the past year. A study of these descriptions and of the detail illustrations which accompany them as well as those

APPERSON

Two new in five-model line

FIVE models will be marketed this season by the Apperson company. Two of these are fours and three sixes. One four and one six are entirely new models having just been added for this season. The two new cars are similar in design, although the dimensions of the motor and wheelbases are different. The new four, which is known as the 4-40, has a 116-inch wheelbase and a 4 by 5 power plant, with L-head block cylinders. Its price is \$1,350. The new six is known as model 6-45 and has a 3.5 by 5.125 motor, with its cylinders also a block and having L-head construction. It sells for \$1,485.

Both cars incorporate many features of design peculiar to Apperson practice. In the motor the air going to the carburetor is preheated by passing through a core in the cylinder casting. Another unique feature is that the casting, which acts as a water outlet at the top of the cylinders is double. Baffle plates and partitions are so arranged in the water passages on the four that the water goes up on one side and comes down on the other, giving a complete circulation. On the six the water is led along a space on the top of the cylinders until it reaches the rear end of the motor and then, passing a horizontal partition, flows back to the forward end.

The frame is narrower at the forward end, giving a more rigid support to the motor and also providing a narrower turning radius. Force-feed lubrication is continued, but now there are independent leads to the camshaft bearings instead of splash. In the structural work of the chassis, some slight changes will be noted tending to lightening and simplifying. The transverse shaft which carries the brake and clutch pedals is now only one-half the length that it was formerly.

The rear support of the gearbox is the same as in the past and the drive members

from that point back are much the same, except that in the new cars the drive is taken through the springs. The spring hangers are new, being in the case of the rear support integral with the frame gusset plates in the rear and of the strong-ribbed section. The torque is taken through the rear springs, which are underslung on the two new models. The Bijur lighting and starting system is supplied as regular equipment.

No change has been made in the contracting band clutch which has formed a part of Apperson construction for several years. There are two universals in the drive. The bodies supplied with the new cars are of molded design with a rounded V-type radiator fitted with a distinctive shield.

ARGO

Small roadster at \$295 featured

THE Argo Motor Co., Jackson, Mich., is a new concern which is placing on the market a small roadster costing \$295. The wheelbase is 90 and tread 44 inches. The dimensions of the two side-by-side seats are 24 by 42 inches. With top and wind-shield the Argo sells at \$315.

The motor is a four-cylinder, water-cooled type having its cylinders, which are 2 $\frac{5}{16}$ by 4, cast in a block of L-head form. The developed power is given as from 8 to 12 horsepower. From the motor, the drive goes through a cone clutch of internal type and thence to a gearset, affording two speeds, forward and reverse.

The propeller shaft back of the gearbox is provided with a universal and then enters a torsion tube which attaches to the axle housing in the usual manner. The rear axle has a ratio of 4 to 1. A feature is the spring suspension which is by means of elliptic springs both front and rear. The frame, pressed steel channel, is well built for a car of this price, and is evidence of the fact that the car is built for service.

Wire wheels carrying 28-inch tires are fitted, while oil side and tail lamps, horn and tools are also included as regular equipment. The approximate weight is given as 850 pounds, the fuel consumption as from 35 to 40 miles per gallon and the speed as from 5 to 40 miles an hour. It is also stated that the little car will negotiate a 10 per cent grade on high gear.

ABBOTT

Three-car line, two fours and a six

THE Abbott is a three-car line, comprising the same two four-cylinder models and the same six as in 1914. These are the 34-40 at \$1,875; the 44-50 at \$2,085, and the Belle Isle six at \$2,290. All carry complete fittings at these prices.

The six has a 3 $\frac{3}{4}$ by 5 $\frac{1}{4}$ motor with cylinders of L-head cast in threes. It employs splash lubrication, circulation by gear pump, Bosch ignition, pressure fuel feed to a Zenith carburetor, and has electric cranking and lighting. The wheelbase is 130 inches, while other details include dry-disk clutch, four-speed gearset in unit with the engine with direct drive on third, and floating rear axle of 4 to 1 ratio, which gets its power through an open shaft of double universal type. Left drive and center control are used. Tires are 35 by 4 $\frac{1}{2}$ on Firestone demountable rims. Wire wheels are optional.

The larger four, model 44-50, has pair-cast cylinders of L-head form, the dimensions being 4 $\frac{1}{2}$ by 5 $\frac{1}{2}$ inches. The gearbox of three speeds is a unit with the motor, and drive goes back through a disk clutch to a floating rear axle of 3 $\frac{1}{2}$ to 1 reduction. The car has 121-inch wheelbase, gravity feed to a Mayer carburetor, electric cranking and lighting and 36 by 4 $\frac{1}{2}$ tires on Booth demountable rims.

The smallest Abbott is equipped with a 4 $\frac{1}{2}$ by 5 $\frac{1}{4}$ motor of unit power plant type, incorporating gearbox and dry-plate clutch with it, as do the others. The cylinders



of the complete cars on other pages will make evident marked improvement in many features which make for greater comfort, greater reliability and more handsome appearance. A study of the detailed sketches will indicate to what an extent the efforts have been directed toward providing for the comfort of driver and passengers. Handy luggage spaces and tool carriers have been one of the points upon which effort has been concentrated.

are L-heads and cast in block. Like the other car, the fuel feed is by gravity to a Mayer carburetor and two-unit electric starting and lighting is fitted. The rear axle also is floating and Booth demountable rims carry 34 by 4 tires. The wheelbase is 116 inches.

AUBURN

New models show many changes

THE Auburn Automobile Co., is producing for 1915 two chassis—a four and a six—which is the same policy as last season. However, the new cars, designated as the 6-40 and the 4-36, are so different in appearance and construction from those they supersede that they may be regarded as entirely new models. Prices have been greatly reduced, the four selling now for \$1,075 as compared with \$1,490 and \$1,590, for roadster and touring car. The six is cut to \$1,550 in either body type, whereas the previous six sold at \$2,100 as a touring car and \$2,000 as a roadster.

In the six, the 3¼ by 5¼ engine has given way to a 3½ by 5¼, L-head block-cast type with gearset in unit and suspension at three points in the chassis. The four continues to have a T-head motor, but it is a 3¼ by 5 in place of the formerly-used 4½ by 5. Like the six, it is a unit power plant with three-point suspension.

Both cars are equipped with electric lighting and cranking, that of the six being provided by a Delco unit, while the four uses Remy apparatus. Carburetors are Rayfields, and fuel feed by the Stewart vacuum system which draws the gasoline from 18-gallon rear tanks on both models. Cone clutches and three-speed selective gearsets are also incorporated in the chassis design.

The steering is on the left and control in the center. There is some difference in the drive features of the two models. The 6-40 has a double-universal open drive shaft with torque arm for drive and torque,

and this operates a floating rear axle. In the four-cylinder construction, a three-quarter floating axle gets its power from a shaft having one universal, and drive is through the springs.

Suspension of the cars is the same, the rear springs being three-quarter elliptic. The six has a wheelbase of 126 inches, and uses 34 by 4 front and rear tires on demountable rims. The four is a 114-inch wheelbase car, and runs on 32 by 4 tires also mounted on demountable rims. The bodies are brought up to latest design of streamline appearance, and fenders are crowned.

ALLEN

Two models instead of one

TWO models instead of one is the Allen offering. This make, which had its inception in the 1914 season with a four-cylinder listing at \$1,395, which is continued at the same price and without mechanical changes, has now been augmented by a smaller chassis also fitted with a four-cylinder motor.

On the larger car, 35 by 4.5 tires, with non-skids in the rear, are now used, instead of the 34 by 4. Two auxiliary seats have been fitted, making it a seven-passenger, instead of five. These seats were furnished last year along with the larger tires at an extra price, but this year they are included in the purchase price. The body has been changed to bring it up-to-date and it is now a streamline form, with a gracefully-sloping hood.

On the smaller chassis a small-bore, long-stroke, 3.625 by 5 block-cast motor is used. The valves are all on the right side, operated by one camshaft. The motor has an exceedingly short overall length and is part of a unit power plant suspended at three points. The valves are 1.625 inches in diameter operated by push rods and are of cast-iron, electrically welded to carbon steel stems. The timing gears are helically cut.

The motor is oiled by a constant level splash system, in which a pump of the plunger type, mounted on the outside of the crankcase, takes the oil from the reservoir and circulates it to the main bearings and thence to the splash troughs. Starting and lighting is accomplished by a 6-volt electric system, which is capable of cranking the engine at 150 r.p.m., and which can carry the full lamp load when acting as a generator at 12 miles per hour. Ignition is by storage battery, coil and distributor.

The transmission system consists of a cone-clutch with a leather-face a sliding selective gearset, providing three forward speeds, and a Weston-Mott floating axle. The control levers, which are central and on the right of the driver, are mounted directly on the housing of the gearbox. The wheels are 32 inches in diameter and carry 3.5-inch tires. The wheelbase is 110 inches and the rear springs three-quarter elliptic. The rounded radiator and streamline body are in conformity with the latest ideas in carriage work. This model is made in either touring or roadster bodies.

ARBENZ

Only minor changes reported

WITH the exception of such minor details as the shape of the lamps and windshields, the Arbenz car will remain the same as for 1914. The line will consist of a four-cylinder chassis upon which two bodies are mounted, one a five-passenger touring and the other a two-passenger roadster.

Both these cars are mounted on a 120-inch wheelbase. The power plant is a 4.125 by 5.5 L-head, with its cylinders cast in pairs. The valves are all located on the left side and are operated by a helical gear driven camshaft. The transverse shaft, across the front end of the motor carries the magneto and water

pump. The crankshaft is carried on three main bearings bushed with bronze. A dual system of ignition is used and electric lighting and starting made up of a Diehl motor, a Wells generator and a Philadelphia storage battery. The system operates at 6 volts and the battery has a capacity of 120-ampere hours.

A 15-gallon gasoline tank located under the front seat supplies fuel by gravity to a Schebler carburetor. The transmission system comprises a leather-faced cone clutch housed in the flywheel, a three-speed selective gearset carried in a unit with the rear axle and a beveled gear floating rear axle. The tires are 36 by 4 all around, fully equipped with demountable rims.

AUSTIN

Body design changed; price lowered

THEIR best friends would not know the new Austin models, so much altered in appearance and construction are they over the previous cars. With true streamline bodies of touring, close-coupled touring and roadster forms, and with material weight reduction throughout the chassis, the present product of the Austin Automobile Co., Grand Rapids, Mich., is reduced from the old figure of \$4,000 to \$3,600. This applies to model 66, which has a 141-inch wheelbase and a 4½ by 6 six-cylinder engine.

An innovation on the new Austin is the use of double cantilever rear springs for which many advantages are claimed. On either side of the frame there are two light cantilever springs, attached at their centers to the frame bracket and shackling at their front ends to the frame, while the upper one attaches above the axle at the rear and the lower one below it. With this construction, two sets of torsion rods and four driving rods are provided. Easier and softer riding action are claimed for this design, for instead of supporting all the car weight of one side on one stiffer and heavier spring, two lighter springs carry it. The factor of safety also is pointed out to be much greater, because, since the car weight is supported at four different points, if any one of the springs should be broken, there would still be three-quarters of the spring capacity on that side. This would be sufficient to continue any drive to its destination, though, of course, more care would have to be taken.

The Austin two-speed axle still is used, but it has been redesigned and considerably lightened throughout. One decided point of weight saving is in the furnishing of an aluminum housing for it.

The motor is unchanged. It is one of the T-head, block type and incorporates Westinghouse combination cranking, lighting and ignition. The fuel system embodies a Master carburetor fed from a Stewart

vacuum tank, the main reservoir of 25-gallons capacity being amidships under the frame. Other specifications are multiple-disk clutch in oil, left drive, center control of three-speed gearset mounted on the frame, and 34 by 4½ straight-side tires.

The equipment is complete and includes Warner speedometer, Sparton horn, clock, demountable rims, and so on. The close-coupled body is new to the line.

BRISCOE

Price reduction on both models

THE Briscoe Motor Co., Jackson, Mich., has reduced the price of its cars \$115, the two models, roadster and touring car, with electric lighting and starting system, now selling at \$785. In general construction they present no changes over 1914. The wheelbase is 107 inches and the tread standard, 56 inches. Probably the most distinctive feature is the disposition of a single headlight in the center of the upper part of the radiator. The frame is hung low, there is a general sloping of the body to the front, and wire wheels are used as standard equipment.

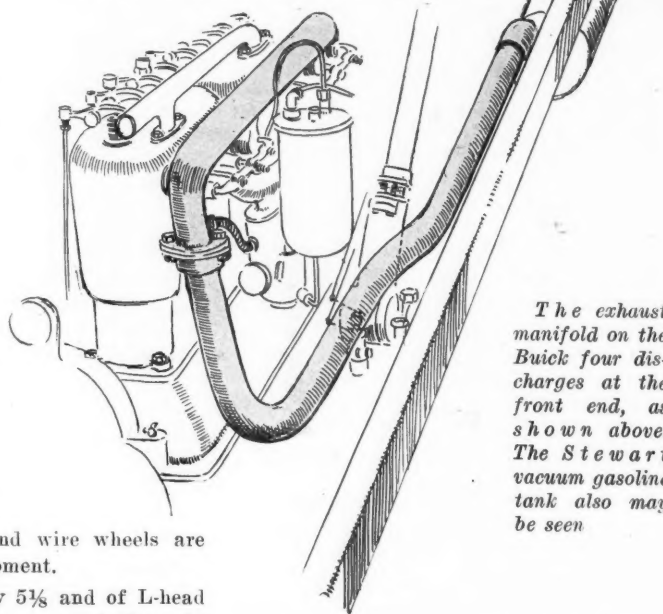
The motor is 3½ by 5½ and of L-head design. Cylinders and upper part of crankcase are integrally cast, and there is a detachable head. Due to the foreign origin perhaps, the motor lays claim to high speed operation and is designed for such running conditions. The drive of camshaft and magneto is by a silent chain running over sprockets on crankshaft camshaft and magneto shaft and at the rear of the cylinders as distinguished from the usual forward location of the drive chains or gears. Another unusual point is the casting together of intake and exhaust manifold, the exhaust gas passages being above the intakes.

The Apeldo combined motor-generator is used for cranking and lighting, this being driven through a silent chain running from the main drive shaft between clutch and gearbox. The unit is placed to the left of the gearbox, and the ratio between elec-

tric unit and its driving shaft is 2½ to 1.

The drive to the rear is through a shaft inclosed in a torsion tube. A floating rear axle is used, which has a standard gear ratio of 3¾ to 1, although a 4 to 1 is optional. Semi-elliptic springs suspend the chassis all around.

The bodies are well designed throughout the line. Particular interest attaches to the roadster seating, which is of "clover-leaf" form. Accommodations for three are provided by setting the center seat a little back of



The exhaust manifold on the Buick four discharges at the front end, as shown above. The Stewart vacuum gasoline tank also may be seen

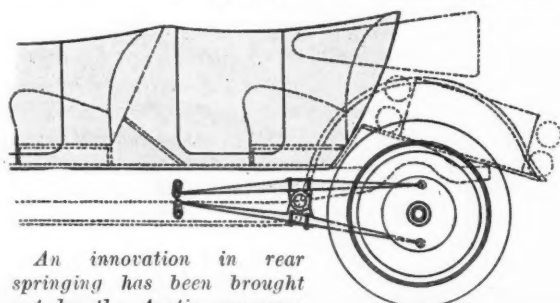
the two side seats in clover-leaf fashion. The rear deck of the roadster has another pleasing feature in its torpeda shape. A coupe at \$1,250, designed similarly to the roadster body, is also a part of the Briscoe line.

BUICK

Four fours and a six announced

A GENERAL reduction in prices, newly designed bodies, radiators rounded at the top, sloping hoods, and general improvement in appearance, are the distinctive features of 1915 Buick models, which, in general mechanical construction are a continuation of the 1914 models.

Four four-cylinder types and one six-cylinder are built this year. Models C-36 and C-24, roadsters, sell at \$900 and \$1,185, respectively, or \$50 less than in 1914. Model C-37, the big four touring car, sells at \$1,235, and the model C-25, a small touring car, sells at \$950, which is a reduction of \$100 on both of these models over the 1914 prices. The six-cylinder model, which last season was listed at \$1,985, now costs \$1,685, a cut of \$300. All Buicks have the valve-in-the-head type of motor which always has characterized these cars. The six and the larger fours have 3¾ by 5 motors, while the small fours, types C-24 and C-25, have 3¾ by 3¾ engines. Cylinders are cast in pairs, and the valve rods



An innovation in rear springing has been brought out by the Austin company. It consists of two cantilever springs, one above the other

run upward from the camshaft to the rockers which actuate the valves. Tungsten-steel valves have replaced nickel-steel ones, while multiple-steel piston rings are used in place of individual rings in each groove. Another slight motor alteration is the lengthening of pistons, so as to give a greater bearing surface and to eliminate any possibilities of piston slap.

Buicks use the combination Delco unit for ignition, lighting and cranking. A special feature in connection with the electric system on the new cars is the complete inclosure of all wires within conduits, so that the wiring is now not only more substantially and neatly arranged, but it is proof against all conditions.

On the larger four-cylinder cars and the six, the vacuum system of gasoline feed is employed with the vacuum tank located on the intake manifolds. The supply tanks remain at the rear. The small fours do not have this system. Another difference between these smaller cars and the others is that the gearset is not in unit with the motor in the former.

Wheelbase of the small four has been increased 1 inch to 106 inches, while that of the six is 130 and of the other fours 112. Full equipment graces each model.

CASE

Model 25 leads the line

CONTINUING its three four-cylinder cars of last season with a number of improvements, the Case company has reduced the prices of two cars and increased the list of one. The model 25, the leader of the line, now is listed at \$1,350 instead of \$1,250, the 35 at \$1,600, a drop of \$250 and the model 40 at \$1,800, a reduction of \$500. The 35 and 40 are being marketed practically in the same form as in 1914, but the smaller car, the 25, now has a wheelbase of 115½ inches instead of 110, the tires increased from 32 by 4 to 34 by 4, the headlights equipped with double bulbs and the spark plug location shifted from the side in the valve plugs to the center of the cylinder casting in holes formerly occupied by the priming cocks. Cantilever springs supplant the platform rear construction.

Battery ignition using the accumulator of the Westinghouse cranking and lighting system supplants the magneto used formerly. The brakes have been increased from 12 inches diameter to 14. The Case company has discontinued buying its cylinder castings from an outside source and for 1915 does the work itself. This applies also to the front axle which is forged in the Case shops.

In the matter of body construction a few changes are to be noted. The lines have been changed completely in accordance with the modern trend of streamlining; a foot rest has been added to the tonneau and in order to prevent the back of the front seat from becoming scratched, a leather covering is provided for the highly-polished metal. The improvement in body

lines has allowed of a long sweeping cowl which has been formed into a fuel tank, the container in the previous models being under the front seat. The feed, however, still is by gravity. A one-man top now is additional equipment.

The chassis features of the model 25 including a four-cylinder T-head, cast-in-pairs motor, 3¾ by 4¾, disk clutch and Brown Lipe three-speed gearset. The design of the 35 is the same as the 25. The motor size is 4¾ by 5½ and the wheelbase is 120 inches.

CRAWFORD

Only two changes in construction

BUT two changes have been made in the Crawford 4-40 which is continued for this season. This is a five-passenger touring model and the changes have been, first, to alter the suspension of the motor from four-point to three-point and, second, to divide the front seat in the body to permit the exit of passengers without disturbing the driver, and also allowing passengers to change from the rear to the front seat without leaving the car. The car will be built with right drive and will be fully equipped with lighting and starting.

In addition to the four, the Crawford company will market a light six, which will be an innovation for this season. It is equipped with a 3.5 by 5 motor, forming part of a unit power plant, a Brown-Lipe gearset and a Timken axle with a full equipment of roller bearings. The body fitted to this car is of five-passenger capacity, streamline design, and is also provided with the aisle between the front seats, as described in the four. This model is left drive and center control, and though a six-cylinder, sells for \$250 less than the four, being listed at \$1,850.

The new six, which will be the leader of the line this season, is an adaptation of the up-to-date lightweight six-cylinder car. It has its L-head cylinders cast in a single block and the crankshaft carried on three main bearings. Both the pump and camshafts are driven by helical gears and the lubrication is by a circulating splash system. For ignition there is a Bosch magneto and for cooling a centrifugal pump and cellular radiator. The gasoline feed is by vacuum from a 20-gallon tank carried on the rear.

A multiple-disk clutch delivers the power to a three-speed gearset and the rear axle as well as the front are Timken products fully equipped with tapered roller bearings. The body is of sheet metal over a wood frame.

CADILLAC

Eight-cylinder motor radical departure

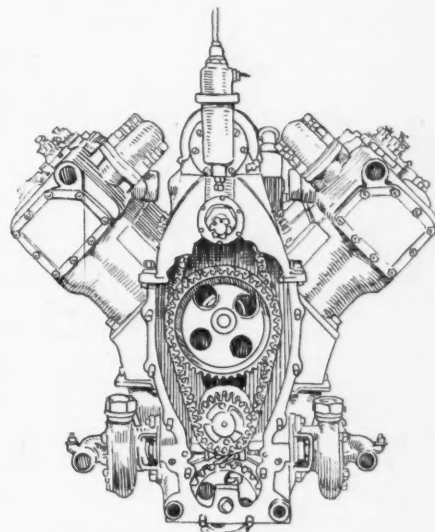
THE most radical change in American motor car construction since the advent of the six-cylinder power plant is presented by the Cadillac Motor Car Co., which now is building eight-cylinder cars only and is the first American concern to

adopt this kind of motor. It is a V-type eight, 3¾ by 5¾, and of high speed type. The open models sell at \$1,975.

The other new features in the chassis are: The wheelbase has been increased from 120 to 122 inches. Instead of right drive and control, left drive with center control has been adopted, although the hinged steering wheel is retained. A disk clutch has replaced the former cone and the gearset now is a unit with the power plant instead of being located amidships, as in former Cadillac construction. In place of the straight bevels used formerly in the rear axle, spring-bevel gears are now used.

Delco combination ignition, lighting and starting still are employed, and in most other respects the design is the same as in the past. Outward body appearance is little different than in 1914, though the bonnet, of practically the same length as heretofore, covers twice as many cylinders.

The Cadillac motor, which has created



The Cadillac eight cylinder, the most radical change since the advent of the six-cylinder motor. The two water pumps and camshaft drive mechanism are made visible

much interest among the motoring public, is said to be slightly lighter than the old four, due to the large reduction in weight of reciprocating parts and to the generous use of aluminum in the crankcase. Of European design, the engine is provided with accurately machined reciprocating parts of lightest weight consistent with strength, in order to permit of the high speeds at which it operates. The power curve shows that the engine develops its maximum of 70 horsepower at 2,400 r.p.m.

In the arrangement of the motor, the two sets of four cylinders are block-cast and look like any block of four. They bolt to the crankcase, which is common to both sets, and their center lines are at an angle of 90 degrees to one another. Only one crankshaft is required, this being the same in design as a four-cylinder motor would use. The two connecting rod ends of opposite cylinders attach to the same throw bearing, one rod having a yoke end

and the other rod going between the arms of this yoke. The two arms of the yoke are pinned to the bushing, which has its bearing against the shaft. The inner rod is free to move on this bushing, having its bearing on the outer surface of the latter.

Only one camshaft is required, this being carried on a plate attached to the top of the crankcase. There are only eight cams, one cam operating two opposite valves through rocker arms attached to the same plate as the camshaft. Silent chains drive camshaft and Delco unit shaft, which is vertically above the other shafting, and between the two sets of cylinders. At the rear end of the Delco unit are the gears for meshing with the flywheel for starting. The carbureter also is carried between the cylinder blocks, a U-shaped manifold running from it to the castings. An elaborate system of force-feed oiling is used, the webs of the crankshaft being drilled and connecting with a supply pipe running along the inside of the crankcase. Another supply pipe carries oil to the camshaft bearings.

Thermostatic regulation of the cooling water temperature is another new thing to motor cars which Cadillac has adopted. By this arrangement, the water in the radiator is cut off when the temperature is low, causing only that in the jackets to circulate until the temperature rises, when a valve automatically opens the radiator supply. When the radiator supply is cut off, the water by-passes through the carbureter jacket, thus heating the carbureter quickly for starting. The temperature of the carbureter water governs the action of the thermostat.

Cadillac offers several closed types of bodies, namely, sedan, limousine, phaeton, cabriolet and coupe on the regular chassis. These are examples of excellent coach work, and are at prices to correspond to the type of body.

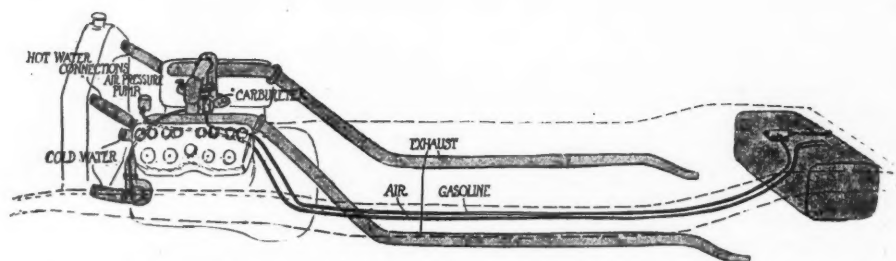
CHANDLER

Increase of 10 per cent in power claimed

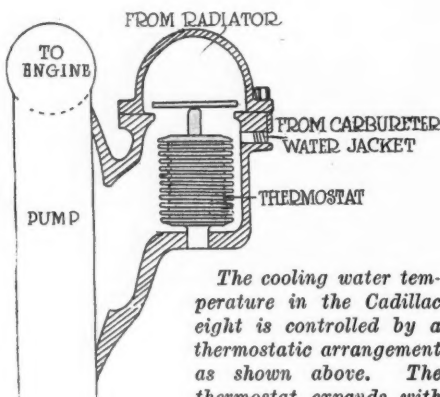
THE keynote of Chandler construction for this year is the greater power obtained from the motor by lightening the flywheel and pistons so that better balance and greater speed may be obtained. Though the bore and stroke are unaltered, being 3½ by 5, the reduction in weight of the working parts is said to result in an increase of 10 per cent.

With this refinement of motor, and with other smaller improvements, the car is offered at a reduction from \$1,785 to \$1,595. This is for roadster or touring car, although closed bodies of various types were added to the line last fall. The open bodies are of the up-to-date sloping type, little altered in general design from those of the season before.

The Chandler company makes a strong point of the light weight of its car. To obtain this end, the chassis is simple and parts made as light as possible consistent with their functions. The six cylinders are



This shows the general arrangement of the fuel, exhaust and water systems of the Cadillac eight. There are two exhausts and two mufflers. Two water pumps are provided and two sets of connections to the cylinders



The cooling water temperature in the Cadillac eight is controlled by a thermostatic arrangement as shown above. The thermostat expands with the heat and is so arranged that it governs the amount of water

cast in L-head fashion in blocks of three, and a unit power plant is obtained by bolting the gearset with its center control to the flywheel housing. One change in the engine equipment is the adoption of Rayfield carbureter. Bosch ignition still is used, while a two-unit Westinghouse electric system for cranking and lighting is employed.

The Chandler chassis has a 120-inch wheelbase, and rear spring suspension is of the three-quarter elliptic type. The drive from the motor is by an uninclosed shaft fitted with two universals, and paralleled by a torsion arm of pressed steel. When first brought out, the car has a torsion arm made of bar stock, but the pressed steel type is lighter.

The rear axle is of floating construction, conventionally designed. Tires are 34 by 4 all around, and demountable rims in addition to electric horn, Jones speedometer, New Haven 8-day clock, Jiffy curtains and lesser items feature the equipment.

COLE

Series 10 Featured by New Four

COLE enters the season with three cars, the Standard four at \$1,485 being the latest addition, while the two others are the 6-50 at \$1,865 and the 6-60 at \$2,465. The latter the larger six has been reduced from \$2,600.

Series 10 is the name given the line and the feature-car is the smaller six, which has a 3½ by 5 L-head motor, with the upper half of the crankcase and the cylinders cast in block, and cylinder heads removable in pairs.

The use of a block, while a departure from previous Cole design, is a step in the right direction, when better alignment, freedom from vibration, greater rigidity and simplicity are considered, and the motor dimensions have not brought about a bulky job. Instead of the usual breather arrangement, an opening is provided through the cover of the valve stems and push-rod housing, so that an individual breather is provided for each pair of cylinders.

The carbureter used is a Stromberg G-2 fed by the Stewart vacuum system and ignition is supplied from the Delco combination unit using automatic spark advance. The generator cuts in at 300 r.p.m., a car speed of approximately 10 miles per hour.

The wheelbase is 120 inches and the running gear essentials are a cone clutch and three-speed gearset united with the motor, Timken front rear axles, the latter being of the floating type, and 34 by 4½ tires on Firestone rims.

The four-cylinder Cole new to the line is made only in seven-passenger form and exhibits all the essential chassis characteristics of the sixes. However, the rear axle gears used in this model are of the spiral-bevel type and the body a newly designed one with a streamline exterior and the interior arranged with two individual front seats. A Northway power plant is used and it consists of a 4¼ by 5¼ motor, cone clutch and three-speed gearbox. The wheelbase is 120 inches, which is 2 inches longer than that of the previous Cole four.

The body on the Standard four has individual front seats.

The large six has been altered little and the noteworthy change is the adoption of the Stewart vacuum feed. The motor is 4¼ by 5¼ and forms a unit plant with a cone clutch and a three-speed gearset. The axles are Timken and the other parts are of standard construction as in other Cole cars.

CHEVROLET

Two chassis offerings, four and six

CHEVROLET is in the ranks with two chassis—a four and a six. The former carries either roadster or touring body, while only the touring type is fitted to the six-cylinder chassis. With roadster body, and styled the Royal Mail, the four is priced at \$750, while with five passenger

body it sells for \$875 and is known as the Baby Grand. The six is offered at \$1,425, which is \$50 less than last season.

With practically no mechanical change, the body of the six is redesigned and streamlined so as to be roomier than it was. In the four-cylinder chassis the wheelbase has been lengthened 2 inches to 106 inches, and the brakes have been made more powerful by an increase in diameter of 2 inches to 12 inches.

The six-cylinder motor is an L-head $3\frac{1}{2}$ by $5\frac{1}{4}$, with cylinders in blocks of three. Thermo-syphon cooling, constant-level splash oiling, and Remy dual ignition are features of this motor. The drive-shaft is inclosed in a torsion tube, bolting at its rear end to the gearbox, the latter being in unit with the rear axle, which is three-quarter floating. Other specifications include cone clutch, platform rear spring suspension, left drive, center control and rear gasoline tank feeding by pressure.

The wheelbase of the six is 112 inches, tires are 34 by 4 and Auto-Lite cranking and lighting are furnished at the price.

The four have the distinctive Chevrolet motor with valves in the head, rockers and springs inclosed within an aluminum cover plate. Twenty-four horsepower is credited to the engine, whose dimensions are $3\frac{1}{2}$ by 4 inches. The cylinder head is a one-piece casting secured to the cylinder block by bolts, making a compact and readily-removable assembly.

Drive is through a cone clutch to a three-speed gearset, located amidships on two frame cross members. Final drive is of the double universal uninclosed shaft type, torque being taken by a rod and drive by the rear springs, which are three-quarter elliptic. Tires are 32 by $3\frac{1}{2}$ on both roadster and touring car. The four-cylinder prices named do not include Auto-Lite electric cranking and lighting. When equipped with it, the price is \$110 extra. Five lamps and Prest-O-Lite tank are furnished at the above figures.

CHALMERS

Only few minor changes made

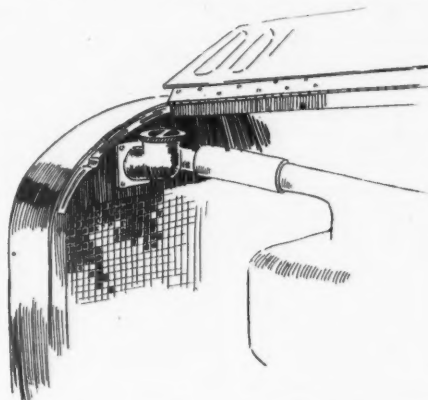
CHALMERS has the same two sixes that it had in 1914. They have been refined in a number of details and on the larger chassis a touring body of entirely new design has been fitted.

In fundamental features the cars are mechanically the same as for the past season, but some minor changes have been made. The cylinder dimensions are the same but the core work has been altered to give greater waterjacket space. The gasoline feed system has been altered to a combination pressure and gravity feed, the gasoline being forced by pressure to a small tank on the dash, thence flowing by gravity. This arrangement has permitted a slight raising of the carburetor giving better accessibility. The carburetor is now the latest waterjacketed model G Rayfield, and the intake manifold has more water-jacketing space than before. While the

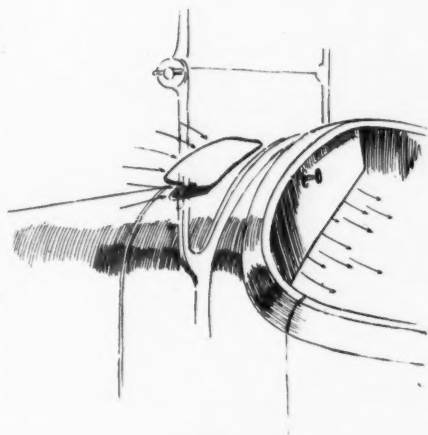
multiple-disk clutch was used in previous cars it has been improved by alternating bronze and steel disks in place of all steel.

On the smaller six, Timken bearings have been added to the front axle. Both axles on this, the Master six model, have been weighted to aid in holding the car on the road. The speedometer drive on both sixes is now the inclosed Empico design.

Equipment is now better than ever before. A new design top, which is a product of the Chalmers shops, is fitted; the storage



The radiator filler cap on the Chalmers is under the hood



A novel ventilator for the forward compartment is used on Chalmers cars

battery is of improved design, better separators being used to eliminate buckling of the plates. A voltmeter has been added to the equipment and a Yale lock fitted to the electric switches. On the smaller car the tires are larger, being 34 by 4.5 instead of 34 by 4.

Five bodies are listed on the smaller car and two on the Master six. The seven-passenger touring car on the Master six is an innovation in that it is a boatline design. The price of the smaller six is \$1,650 or \$150 less than in 1914 for the five-passenger car. The seven-passenger car and the phaeton both sell at \$2,400.

CARTERCAR

Only one model for 1915

MODEL 9 is the one Cartercar made this year. In 1914 this was known as model 7. Model 5, which was the other car made last year, the more expensive of

the two, has been discontinued. Both the roadster and touring types of model 9 cost \$1,250.

The principal features of the 1915 car are the redesigned bodies for both the roadster and touring cars, which have a sloping hood and neat appearing cowl. Although the friction-drive design remains the same, the copper transmission disk has been decreased 1 inch in diameter; thus there is no difference in reduction ratio between the motor and rear wheels through the fitting of tires 33 by 4 instead of 32 by $3\frac{1}{2}$, which was last year's size. In the rear axle the gear ratio has been lowered from 3.45 to 1 to 4 to 1, also.

The Cartercar uses a $3\frac{1}{2}$ by 5 four-cylinder Northway block motor which has a detachable cylinder head. By increasing the clear opening of the valves from $1\frac{1}{8}$ inch to $1\frac{3}{8}$ inch and by other slight differences in design, the power of the engine is made greater, the developed horsepower being 30 at 1,700 r. p. m. The construction of the engine is of the type with upper half of crankcase cast integrally with the cylinders, the flywheel being uninclosed. It is very similar to the conventional unit power plant construction but without a gearbox.

Deleo combination ignition, lighting and cranking is used, the unit being driven off the end of the pump-shaft when a generator, and meshing with flywheel teeth when performing the cranking operation.

In the Cartercar drive system, the drive shaft from the engine connects to the transverse revolving transmission disk, $19\frac{1}{4}$ inches in diameter. Back of this and carried on a jackshaft is a fiber-faced friction wheel which revolves at right angles to the driving disk, and which is $21\frac{1}{4}$ inches diameter. A pedal pulls the driving disk away from the friction wheel so the latter may be shifted into different positions with relation to the disk so as to give different speed ratios. An inclosed silent chain takes the power back from the jackshaft to the rear axle.

Steering and control are on the right, and the wheelbase of model 9 is 106 inches. Equipment is complete with demountable rims, windshield, top, electric horn, speedometer, tools and so on.

CUNNINGHAM

Old models refined and continued

ONE chassis which is a continuation of the car of last season will be built by the Cunningham company. In continuing this model a few refinements have been made, one of which has been the substitution of a dry-plate disk clutch for the cone, a simplified brake system eliminating many of the parts of the linkage and a new series of body design.

Cunningham motor is a four-cylinder 4.75 by 5.75 valve-in-the-head. The cylinders are cast in pairs with a removable head; the manifolds are separate castings. The motor is suspended at four points.

Oil is forced under pressure to the main

bearings, but all other bearing surfaces are taken care of by the lubricant, which is splashed from the connecting rods. A gear pump takes care of the circulation, bringing the oil from the reservoir, which is in the lower half of the crankcase.

Ignition is by a dual system and carburetion by a Stromberg model G 1.5-inch size with a waterjacketed mixing chamber and a hot-air pipe. Fuel feed is by pressure, the gasoline tank being under the rear end of the frame and having a capacity of 20 gallons. The electric starting and lighting system operates at 6 volts.

The clutch is a disk having steel to steel friction surfaces and being housed in the flywheel. The gearbox is in a unit with the motor and is of the selective type, having three speeds. A spiral bevel rear drive is used in connection with a floating axle. The wheelbase is 129 inches and the tires 37 by 5.

CYCLEPLANE

Two chassis and three bodies

TWO chassis upon which there are mounted three body styles is the offering of the Cycleplane company. These two models are known respectively as the Tourist and Traveler. On the Tourist are two bodies, one a roadster of two-passenger capacity and the other a touring of three. On the Traveler, which is a two-cylinder car, there is only a tandem roadster of two-passenger capacity.

The four-cylinder model has its L-head cylinders cast in a single block. Valves are on the left and covered, providing the neat power plant common to the block-cast design. The two-cylinder model has its cylinders cast singly, one valve being on the left and the other in the head. Cooling on both cars is by thermo-syphon and oiling by splash. The only difference in the oiling systems is that due to the necessities of two and four-cylinder practice. Both pumps are of the plunger variety, circulating the oil to the main bearings and thence to the splash troughs, where it is picked up by the connecting rods. Both cars use single ignition, in the Tourist the make being optional, while in the Traveler, the Atwater Kent with automatic spark advance is regular equipment.

The Cycleplane company is using its own make of carburetor for the four-cylinder car, while a Schebler motoreycle model is used on the two-cylinder. A selective gearset with three speeds is used on the four, while the two has a planetary gearset with two speeds. Another difference in the drive is that the four has bevel gears, while the two uses the chain. The wheelbases are respectively 108 and 96 inches and the tires on the four are 28 by 3, while on the two they are 28 by 2½.

DORRIS

Company makes only a four

ONE model, a four-cylinder, is the offering of the Dorris company for this season. This car, mounted on a 121-inch

wheelbase chassis is a direct continuation of the model marketed last year and is a result of 9 years' development by the Dorris Motor Car Co.

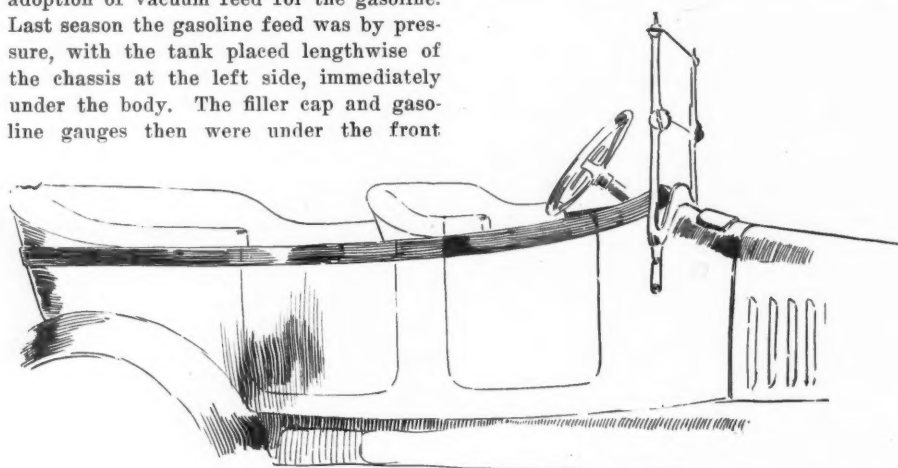
The four-cylinder overhead valve motor has its 4.375 by 5 cylinders cast in pairs. The Dorris dry-plate clutch and fan flywheel are continued as features of the unit power plant in connection with the three-speed gearbox used last season. Last year the clutch was considerably overhauled by adding a number of plates and using lighter springs. The gearbox remains the same as for the past season, with the exception that the levers are in a more accessible position than last season, on account of having been moved forward slightly.

An alteration that is in line with the policy of several concerns this year is the adoption of vacuum feed for the gasoline. Last season the gasoline feed was by pressure, with the tank placed lengthwise of the chassis at the left side, immediately under the body. The filler cap and gasoline gauges then were under the front

circulates the oil to the main bearings, whence it flows to the splash troughs to meet the connecting rods. The splash takes care of the cylinders, camshaft bearings, etc.

The ignition is by a single magneto system, the Berling high-tension instrument being used with fixed spark. The carburetor is a Holley and the gasoline tank of 5.5 gallons capacity, fed by gravity from the dash. Electric starting is extra, but a Dyneto generator and Willard storage battery form part of the lighting equipment of the car.

The dry-disk clutch is housed in the flywheel and has asbestos-against-steel driving faces. The three-speed gearset is selective and is mounted amidships. Control is in the center and the drive is on the left. The wheels are the Houk de-



The Chalmers boat body has shown a nice swing from windshield to the rear. The ventilator illustrated on the previous page also is visible

floor boards. A cut in price from \$2,500 to \$2,200 in the five-passenger touring car body and from \$2,550 to \$2,250 for the seven-passenger touring is another change for this season. In body work an addition to the line is in the sedan, which is listed at \$2,800. It is mounted on the same 121-inch wheelbase chassis as the other two cars.

DILE

Low-priced two-passenger roadster

ANOTHER new car in the low-priced class is the Dile. It is made in one body-type only, a two-passenger roadster, with a four-cylinder 2.625 by 4 block power plant, dry plate clutch, three-speed gearbox, with shaft drive to a semi-floating rear axle. All the transmission parts and axle are mounted on annular ball bearings.

Everything has been done throughout this little car to keep the weight down and at the same time provide ample power and room for the two passengers. The valves are on the right, driven by an integral camshaft, which is operated from the timing gear case by spur gears. Cooling is accomplished by thermo-syphon and lubrication by a plunger pump, which is operated from the camshaft. This pump

tachable wire design and one set of brakes is located on the rear pinion shaft of the differential and the other internal on the wheeldrums.

DETROITER

Car made larger and roomier

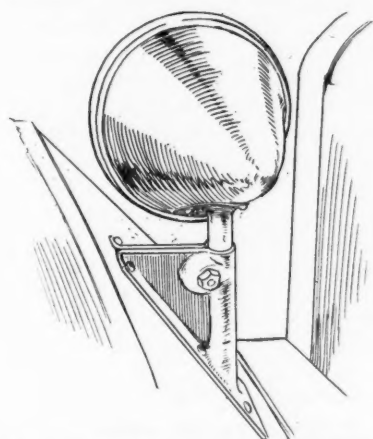
THE Briggs-Detroit car for 1915 is fundamentally the same as the four-cylinder design put out for last season. A number of detail improvements, however, have been made. The motor is a 3 by 5 L-head block plant. Practically all the other important dimensions remain the same, except the wheelbase. This has been elongated by 8 inches, now measuring 112 inches. Although the car is still of the same weight, it is larger and more roomy due to the increase in wheelbase. The fact that no weight has been added is credited to the use of drop forging in place of casting for the levers and many other fittings about the car.

In appearance the car has been considerably altered. There is a round radiator, tapered hood, and full streamline, flush-sided body. A mud apron has been added to the bottom of the radiator and the rear appearance changed by removing the bracket from the rear platform spring perch and in its place supporting the

spring directly from the rear frame torque member. The springs have had an extra leaf added to them.

It has been found possible to raise the carbureter 4 inches, due to placing the gasoline tank under the cowl. While the motor support still is a three-point scheme there now is a full cross member to take the rear support and a new type of front member has been fitted which permits the motor to be lifted directly out of the frame. The starting motor now bolts directly against the front of the motor, whereas last year it was held on a separate shelf. This year the starting and lighting outfit is a Westinghouse, although operating at the same voltage and practically the same connection as the previous type.

An innovation for this season is the use



On the Dodge car the headlights are fastened through the fender to the fender supports. The lamps are back of the radiator front

of an oil level warning light which flashes when the oil level in the crankcase drops to a dangerous point. The bodies now are roomier and 1.5 inches lower than before, the running boards free, and the doors widened to 24 inches. The fenders are crowned and the top a one-man design.

DODGE

New car a \$785 five-passenger

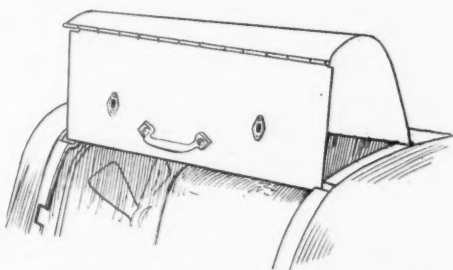
LATE in the fall Dodge Bros., Detroit, uncovered the car about which there had been much speculation in motoring circles, and showed it to be a sturdy five-passenger of 110-inch wheelbase, priced at \$785 with complete equipment. The motor is a 3½ by 4½, which has 24 S. A. E. horsepower, while the body is an example of trim lines, and is made entirely of steel, even to the cowl dash. The body frame, as well as the panels have no wood in them. A pleasing curve is given the domed fenders, which meet the clear running boards in substantial fashion. Only the one body type is offered.

There is nothing unusual about the mechanical design of the car, although every detail has undergone careful testing before it was decided upon. One point of advantage is the provision in the gearset for shifting the countershaft driving gear out

of mesh with the mainshaft gear when the drive is direct. This means that when the car is in high, the countershaft is not rotating, with resultant lessening of noise and wear.

The specifications include the block cast, L-head motor with gearbox in unit, North-East cranking and lighting of single-unit type, Eisemann magneto ignition, cooling by centrifugal pump circulation, separate cylinder head held to the main casting by steel bolts, cone clutch, drive through propeller shaft inclosed in a torsion tube to a floating rear axle, three-quarter elliptic rear springs, overslung frame, left drive and center control.

Some of the equipment items are Jones speedometer, one-man top, rain vision and ventilating windshield, Willard storage battery, and 32 by 3½ tires on demountable rims.



In making carbureter adjustments, etc., the Dodge hood may be held in place as shown. Small notches support the hood corners

The design of the motor suggests substantialness and power. The intake passages are cored in the casting, running from the single opening to the carbureter on the left to the intake ports on the other side, the cored passages being between cylinders Nos. 2 and 3. The exhaust manifold is a separate casting. The reciprocating parts are of standard design throughout, although the use of thin steel piston rings, three to each ring groove, is specially notable.

The motor is oiled by a circulating splash arrangement, and the motor-generator, mounted on the left forward side of the engine, is of the 12-volt type driving through inclosed silent chain from the crankshaft with a 3 to 1 reduction.

The floating rear axle has a pressed steel housing, and mounted on it are the brake shafts and equalizers, allowing the operating rods to run forward centrally of the frame. The latter is well-braced with three cross members, and carries a 15-gallon fuel tank at the rear. The feed is by pressure.

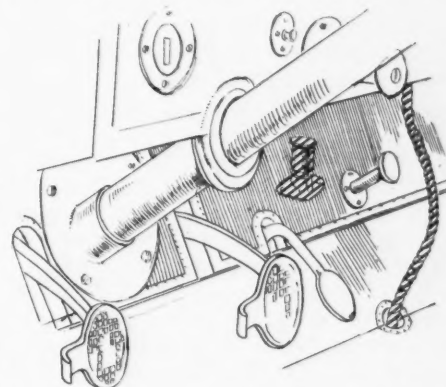
ENGER

Touring body on six-cylinder chassis

A SIX-CYLINDER chassis with a 124-inch wheelbase is the offering of the Enger Motor Car Co. On this is fitted a streamline body with a six or seven-passenger capacity and clean exterior without any luggage being carried upon the running boards.

The Continental L-head block power plant is used. The valves are on the right, together with the pump and generator shaft from which the Atwater Kent distributor is driven by a bevel gear. On the right side of the motor is the carbureter and cranking motor which engages with teeth on the flywheel. The carbureter is fitted with a dash adjustment for easy starting and is waterjacketed. The oil breather and filler opening is also on this side of the motor, and there is also a gauge for determining the oil level.

Connections between the motor and gearset is made through a multiple-disk clutch housed in the flywheel which is inclosed in a bell-shaped extension of the crankcase to which is bolted the gearbox. Three speeds are provided by the gearset, the



The clutch collar on the Dodge car may be lubricated without lifting the floorboards. The small grease cup shown above supplies lubricant to this collar. Note also the speedometer shaft which is driven from the end of the gearset

lever being mounted directly on the top of the housing in accordance with general practice for central control. Two universals are used in the drive and no torque or radius rods are provided. The functions of these being performed by the spring. In order to stiffen the springs sufficiently for their dual service in suspension and torque transmission the main leaves are constructed of vanadium steel.

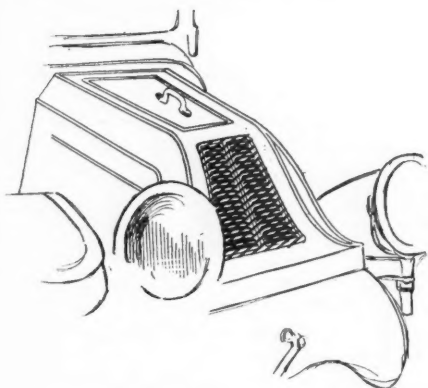
In body work the streamline form has been adhered to. The seating arrangement is provided by the ordinary front and tonneau seats with two auxiliary seats which fold in the rear.

EMPIRE

Price biggest change in line

PRICE is the biggest change made in the Empire line for this season. The chassis remains the same as it has been for the past three seasons. The same body that was marketed last year for \$900 can now be purchased for \$850. In addition to this, however, model 31-40, which is an improved streamline five-passenger touring car has been added to sell at \$975. A new roadster, which is of a design parallel to the new touring car in equipment and general appearance, is sold at \$875.

In bringing out the new car the most



A shutter effect has been given the front of the Franklin sloping hood. The former car used a grill type ventilator

important change outside of the entirely new body is the adoption of the Remy lighting, starting and ignition system. The mounting of this has, of course, necessitated some small changes in the exterior of the motor, although all the principal dimensions remain the same. The oiling pump now is a horizontal instead of a vertical design and an oil pressure chamber is integral with the pump in order to maintain a steady flow to each of the leads. A priming cup has been mounted on the oil pressure chamber so that in case the car has not been used for some time the proper working of the pump will be insured. Formerly the clutch adjustment was held by a number of steel plungers, but now it is permanently secured by bolts.

The new lighting, starting and ignition system is of special interest in that it is the latest product of the Remy plant. It is a motor-generator outfit with battery ignition. The motor generator is cylindrical in shape and is carried on the forward end of the motor on the right side. A single armature with a compound winding, operating at 12 volts, performs the function of a cranking motor and lighting generator. The generator commences to charge the battery at an engine speed of 350 r. p. m. and carries the lamp load at any speed above this with an output of 6 amperes.

A choice of the touring car which was sold last year, equipped with accetylene lighting, and the new touring car with electric lighting and the streamline roadster is offered. The 3.75 by 4.5 power plants are used on all cars.

F. R. P.

Car without body at \$5,000

A NEW speed creation has been brought out under the name of F. R. P., by Finley R. Porter, former chief engineer of the Mercer company. It is made up only in chassis form and without a body sells for \$5,000. The chassis is a study in the use of alloy steel. The 4.6 by 6.75 I-head motor is fitted with camshafts, crankshafts and connecting rods of hollow chrome vanadium steel and throughout the car this alloy has been employed

to give the utmost lightness with the greatest possible strength. Magnalium, an aluminum-magnesium alloy, has been employed for housings.

The motor, in some details, shows different design from any heretofore employed in America. It has its four cylinders cast in a block and is provided with an overhead camshaft, which is driven by a worm and vertical shaft at the front end of the motor. The valves are the 45-degree poppet type, but are so formed that when they are closed the combustion chamber is practically a hemisphere. In every other particular, with the exception of double, 80-pound valve spring, the design does not depart from ordinary valve-in-head practice to any marked degree.

An unusual oil pump, which has a capacity of 30 pounds at 1,500 r.p.m. and which has an ultimate capacity of 600 pounds, is used. The pump is a rotary piston design, operated by two cams located at the bottom end of the vertical shaft which drives the camshaft.

The clutch is a cone housed within the fly-wheel. The latter is 21 inches in diameter and is a steel forging providing a clutch surface 19 inches in diameter and 2.5 inches face width. There is a compensating joint between the clutch and the gearbox, which provides four speeds. The shaft is a hollow member and takes the drive through two universals to a straight-bevel gear differential. Chrome vanadium gears are used here and the driving stress is transmitted through the springs.

For service purposes there is a brake on the shaft and the emergency is carried on the rear wheel. The steering gear is a worm and full gear with a magnalium housing and a 2-inch post. The complete electric equipment is made by Bosch and the wheelbase is optional to suit the style of body ordered.

FRANKLIN

Few changes save in price

THE most important change the Franklin company has made is in bringing out its series six for the 1915 season at \$2,150, a cut of \$150 on the price of the touring cars and roadsters. On the closed cars a still greater reduction has been made, \$200 on the berlin and sedan and \$350 on the coupe.

Mechanically only one change will be found on the motor and that in the fitting of the oil adjustment on the cowl board instead of under the hood. In the starting and lighting system better accessibility has been obtained and by an improvement in the dyneto commutator and brushes, this system is now 40 pounds lighter than it was before.

The only other important change in the chassis is in the rear axle where spiral-bevel gears have been adopted in place of the former straight-bevel type. A number of small details such as the spring pivot bolts, the front springs, magneto at-

tachment, etc., have been revamped. The magneto now is attached by two dowel pins, and a divided metal strap over the top in place of the bolted-on brackets used last year. In the front spring the deflection was 1 inch to 180 pounds, now it is 1 inch to 200 pounds. In the rear springs no change has been made. In the spring pivot bolts a new bushing has been employed which incorporates a felt washer instead to keep the dirt out and the oil in.

Better equipment at the lower price is the result of increased production efficiency in the Franklin plant. This season either the Goodrich Silvertown cord tires, or the Goodyear Power-Saver cord type are offered as regular equipment. Another provision which is an innovation for the Franklin is the fitting of the Hartford single-cylinder tire pump. This together with the bracket which supports it weighs 6.5 pounds. By the use of this pump the Franklin company claims to have removed the reason for the heavier type of demountable rim and now substitutes the Q. D. type.

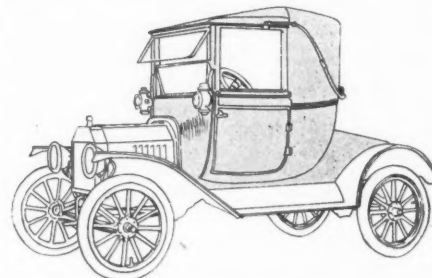
In body work the front doors have been made wider and set back a little to permit of easier entrance. Fenders are wider and the rivets now are invisible. Side lights have been eliminated. The Franklin is one of the few cars which fits a luggage carrier as regular equipment.

FIAT

Body styles only changes

THE only changes made in the Fiat car are those affecting the body style. The cowl will have a greater curvature, making a small dash, which harmonizes with the general lines of the car. Multiple-bulb headlamps will be used, eliminating the side lamps.

There are three models of Fiat, known respectively as 54, 55, 56. The first two of these are four-cylinder types and the third is a six. The Fiat design is distinguished by the fact that the motors are all of the block type, even the six having a very short overall length. The Fiat company manufactures on the metric system and consequently the bore and strokes of their motors are in millimeters, but translated to inches are respectively 4.4 by 6, 5.12 by 6.75 for the fours and the six has the same bore and stroke as the smaller four.



The Ford company has brought out two new body types for this season, a sedan and a coupelet. The latter is shown above and its price is \$750

The cylinders are all L-head, carrying the valves on the left side. The manifolds are cast integrally with the cylinders, the result being a motor of small dimensions and clean exterior appearance. Helical gears are used on all the models to drive the camshaft, while the magneto, water pump, etc., are operated from a transverse shaft.

Pressure feed lubrication is used, the oil being circulated by a gear pump. Water circulation is maintained by a centrifugal pump, the remaining part of the cooling system being made up by ample water jackets in connection with a honeycomb radiator. The fan is formed by the pitched blades of the flywheel.

Ignition is accomplished by the Bosch dual system and starting and lighting by Westinghouse in connection with a Willard storage battery. In transmitting the drive disk-in-oil clutches are used, the friction faces being steel to steel and the housing being within the flywheel. All models have four-speed gearboxes, with direct on fourth, and all models have a rather high gear ratio, the lowest being in the six, where a ratio of 3.06 to 1 is used. A feature of Fiat construction is the pressed-steel rear axle housing, which eliminates both radius and torque, rods being continuous to a forked yoke, which connects with the gearbox.

FORD

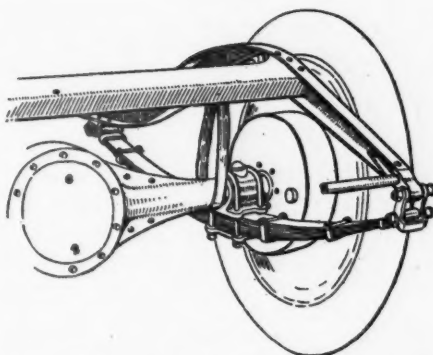
Changes made in body design

THOUGH the Ford bodies have been redesigned, and a sedan at \$975 and coupelet at \$750 have been added to the touring, roadster and town car models, selling, respectively, at \$490, \$440 and \$690, the chassis still is the well known model T design. All the new bodies have been highly finished. This applies especially to the closed models, which are made to meet the tastes of the most exacting.

The coupelet is of the type which may have the top folded back when weather permits; but it also may be closed so no water or snow can get in. Then it is virtually a coupe. The upholstery is deep and windows wide in sliding sash. The sedan has two wide doors, and provides seating for five, three in the rear seat and two in front on individual chair type seats. The right hand seat is on a pivot and folds back out of the way. Wide window panels above the doors and in the rear make for clear vision in all directions.

The model T chassis has a 100-inch wheelbase and is propelled by a 3¼ by 4, block, L-head motor cooled by thermo-syphon. This engine is three-point suspended in the frame, and a feature is the flywheel magneto, which provides the ignition current, a design adopted by this concern and used for a number of years.

Planetary transmission is employed which gives two forward speeds and reverse. The drive shaft is inclosed with a torsion tube which is a unit with the rear axle housing. The clutch is a steel disk



On the new Haynes light six the frame has a high arch over the rear axle which affords a means of obtaining long flat semi-elliptic springs and hence easy riding

design, brakes are on transmission and rear wheels, the former being the service set. Semi-elliptic cross springs are used front and rear, shackling at their ends to the axles. The front tires are 30 by 3, and the rear, 30 by 3½.

FIRESTONE-COLUMBUS

Larger four of last season dropped

ONE four and one six are listed by Firestone-Columbus this season. The larger four of last year, which was only fitted on a race-about body, has been discontinued. The bores and strokes of the four and six, which are made for this season, are the same, 4.125 by 5.25. The four-cylinder motor has the cylinders cast in a single block, while on the six they are in two groups of threes. Both have L-heads with the valves on the left side.

Last season only the six-cylinder model was equipped with the Gray & Davis lighting and starting system, but this year the four also has been fitted with it. A difference in the electrical equipment, however, which has been maintained, is in the ignition. On the four, the Splitdorf dual system is employed, while on the six the Connecticut outfit forms a part of the double system. The carburetor on the four is a Schebler, while on the six it is a Rayfield. The Schebler carburetor is not equipped with hot-air pipe, while on the Rayfield this equipment is used. The feed of gasoline is accomplished by gravity on both models.

Differences between the construction of the four and six are noticeable also throughout the drive. While the four has a cone clutch, amidship gearbox, without the unit power plant feature, the six has a disk clutch and a unit power plant in which the three-speed gearbox is incorporated in the same housing as the clutch. This being a bell-shaped casing, which is a continuation of the crankcase. Both the six and four have bevel final drive to a floating axle. The wheelbases of the two cars are respectively 116 and 132 for the four and six, and the tires, 34 by 4 and 36 by 4.5. The six-cylinder car has smaller tires in the front than in the rear, 36 by 4 serving for this purpose. In body work

the four is made up in roadster and touring, while the six can be had in either five-passenger touring or seven-passenger touring.

GLIDE

Brake, clutch, and body changes

CHANGES affecting the brake mechanism, body, clutch, carburetor air control and windshield are to be seen on the four-cylinder Glide, the passenger car mainstay of the Bartholemew Co., Peoria, Ill. The tonneau seat is slightly wider than in the 1914 model and a compartment has been formed under the front seat, the space being large enough to be used as a suit-case carrier or retainer for packages, etc.

The braking system is entirely new and consists of a two-piece brake operating shaft extending from one drum to the other and being split near the middle. The abutting ends of this shaft each have an operating lever and these two levers are clamped together. One of them is connected by a pull-rod with the foot-brake pedal. This construction enables the brakes to be adjusted independently while at the same time providing means for their simultaneous operation, giving the advantages of equalizers and preventing the possibility of one band refusing to do its duty. A tool box has been provided under the running board apron.

The carburetor air control is new. It consists of a knurled button in the center of the steering wheel and forms an accessible control for the mixture. An additional feature is that depression of the same button operates the electric horn.

Top side sway has been banished from the Glide by the new windshield mounting the brackets of which are built into the body. These brackets have attached to them arms which in turn carry conical supporting lugs which forms the connection to the windshield metal frame. The top brackets are attached to eyes on the side arms.

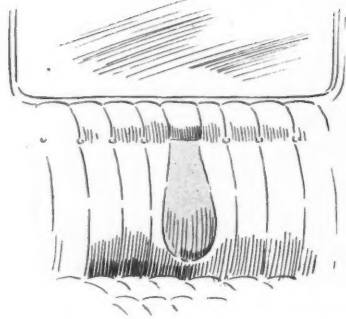
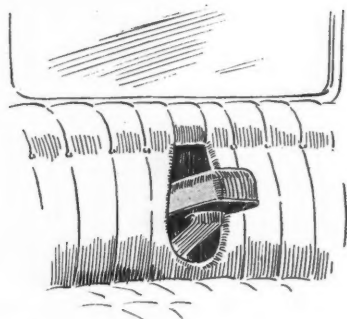
No changes, with the exception of a disk clutch supplants the cone of 1914, have been made in the chassis. The motor is a four 3½ by 5, block cast, thermo-syphon cooled and fitted with Westinghouse ignition cranking and lighting system. The car's wheelbase is 114 inches.

GRANT

Six-cylinder at \$795 offered

A SIX at \$795 is the offering of the Grant company for this season. In addition to this the four-cylinder model has been improved and continued.

The six, which will be the leader, has a 106-inch wheelbase, standard tread, and is equipped with a 2.875 by 4.25-inch block motor. Other specifications are a three-speed gearset, floating rear axle, left drive, center control, cone clutch, cantilever rear spring suspension, electric motor-generator for lighting and cranking and cowl gasoline tank. The price mentioned includes all equipment, but a car



In the Hudson limousine there is an arm rest as shown at the left which may be pushed down as shown at the right

can be had for \$45 less without electric cranking and lighting. In this case acetylene lamps are fitted. The body is a five-passenger touring type, with boat lines, having a sheered gunwhale. The power plant of the six is a unit and the valves are in the heads of the cylinders. The motor is cooled by the thermo-syphon system and lubricated by a combination splash and pressure system, in which the oil is circulated by a gear pump. Ignition is accomplished by means of current taken from the storage battery and distributed by the Atwater Kent system with automatic advance.

The four has a 2.75 by 4 L-head block power plant with the valves on the left. It is also cooled by the thermo-syphon system and oiled by splash splash with a vacuum feed. A single ignition system is used, in which the current is furnished by a Swiss magneto with hand-spark control. The carburetor is a Mayer fed by gravity. The electric lighting and starting system is the Allis-Chalmers. A cone clutch is used in connection with a progressive two-speed gearbox on the rear axle. The axle itself is three-quarter floating and the drive is taken through a torsion tube and radius rods. The wheelbase is 90 inches, the wheels wire and the tires 28 by 3 clinchers. This model is only made up with a roadster body.

GREAT EAGLE

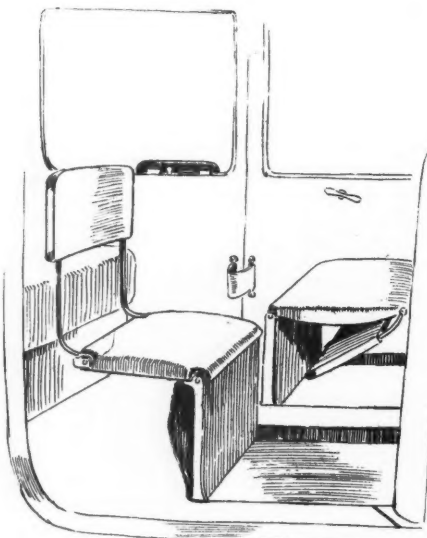
Is a made-to-order car

THE Great Eagle six-cylinder car, manufactured by the United States Carriage Co., Columbus, O., is a made-to-order proposition, most of the inclosed cars being of large carrying capacity. A ten-passenger limousine is a feature of the line.

HAYNES

Six at \$1,485 new to line

THE Haynes cars for 1915 consist of a smaller six at \$1,485, new to the line, while the larger six, model 31-6 and the four, model 32-4 offered last year are still to be had. The 32-4 now is listed at \$1,660 instead of \$1,785 and the 31-6 at \$2,250, a reduction of \$250. The electric gearshift featured last season is made optional equipment at \$125 additional only on the improved models and not on the new cars



How the extra seats in the Hudson are folded into depressions in the floor

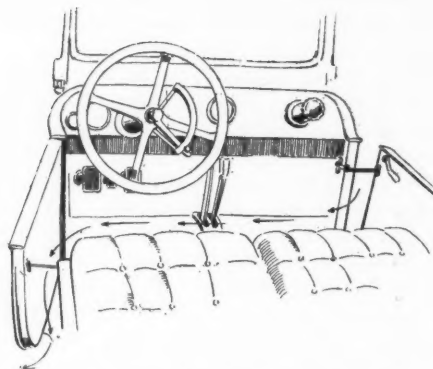
which will come through with the gearshift hand-operated.

The new six has a 121-inch wheelbase and the rear of the frame is formed into a high arch over the rear axle. This construction has resulted in allowing long, flat, semi-elliptic springs to be used. A departure from former Haynes practice is seen in the motor, which is a block L-head casting 3½ by 5. A feature of this engine is the oiling system which is a combination force feed and splash in which a plunger pump circulates oil through the motor at the rate of a ½ gallon per minute.

A new type of dry-disk clutch, an entirely new body, a Stewart vacuum gasoline feed are other notable features of this Haynes six. For the first time the company is building its own rear axles and both housing and shafts of Haynes make are in the new car. The others use Timken axles.

Cranking and lighting is by the Leece-Neville two-unit system, and the storage battery used in connection with it feeds through a combination Remy circuit breaker and distributor for supplying the ignition current. A new type of streamline body is mounted on this chassis.

The four model 32-4 has an L-head motor with pair-cast cylinders of 4¼ by 5½. The clutch is of the contracting band type



How the forward doors in the Hudson may be held open so that ventilation may be obtained. Note that one door opens from the front and the other from the rear end

and the rear axle, a floating. The wheelbase is 118 inches, and the tires 34 by 4. The large Haynes six has the same motor dimensions as the four, and the same general chassis characteristics. The wheelbase is 130 inches.

HUDSON

Two six models are continued

HUDSON continues to make its two sixes with detail changes mechanically, these being principally in the leader, the smaller model, known as the six-40. Its price has also been materially reduced from \$1,750 to \$1,550, while that of the model six-54, is left at its figure of \$2,350. The latter is very little altered from the past season, meeting the demands of a class of buyers which desires the bigger types of machines. A landau-limousine at \$2,700 has been added to the body styles of the six-40.

The general mechanical layout of the six-40 and the outward appearance are the same practically as last season, although several detail changes have been effected, such as the use a block casting for the six cylinders, instead of their being cast in groups of three. This makes it possible to eliminate an external intake manifold, the gas distribution from the carburetor being by cored passages in the cylinder casting. Due to finer balance of reciprocating parts and to an increase of ¼ inch to the crankshaft diameter, the horsepower has been augmented, it ranging from 40 to 47, this attained by the resultant smoother running action.

The dimensions of the motor are of the popular 3½ by 5 size, and L-shaped construction with gearset in unit is used. In the cooling system a more efficient type of radiator is employed, while automatic spark advance has been added to the hand lever advance. This is an improvement which is made in the combination Delco unit which supplies current for lights, and takes care of cranking as well as ignition.

In the six-40 chassis, the principal refinements are the replacing of a solid tapered drive shaft by a tubular type of uniform cross section throughout; by the use of self-lubricating bushings in the steering connec-

tions, brake shafts and steering column tube, making attention to them practically unnecessary; and by the lightening of the weight of the cowl gasoline tank by making the fittings of pressed steel instead of cast iron.

Other chassis features of the six-40 are the Hotchkiss drive through the rear springs, the tapered frame, which gives good body support and the speedometer drive from the propeller shaft. The car has 123-inch wheelbase with left drive and center control.

The six-54 has much the same appearance as the smaller six, though on a somewhat larger scale. The motor is a $4\frac{1}{8}$ by $5\frac{1}{4}$, of L-head type, with cylinders in threes. Delco combination electrical system also is used, while a four-speed gearset with direct on third still features the car. The drive shaft is of the double-universal type, but a torsion arm takes drive and torque. The frame tapers as it does on the six-40, and left drive with center control are provided. The cowl gasoline tank is also used. Wheelbase is 135 inches. An attractive line of closed bodies is supplied for either chassis.

HERRESHOFF

New car by a new concern

THE Herreshoff of this season is an entirely new product and put out by an entirely different concern than the Herreshoff of last year. Although the Herreshoff Light Car Co., the maker, is an outgrowth of the former Herreshoff Motor Co., the two cars are entirely distinct. The Herreshoff for this season is built only in a roadster form on a 94-inch wheelbase with a 44-inch tread. It has a four-cylinder block power plant with 2.375 by 3.25 cylinders. The valves are on the right side of the cylinder casting and are inclosed by side plates.

Everything about the car corresponds to the practice used in the manufacture of larger cars and the equipment is complete in every respect. Cooling is taken care of by a thermo-syphon system without a fan. Lubrication is by combination pressure feed and splash and ignition by the Atwater Kent system with automatic distributor.

Gasoline is fed by gravity from the four-gallon tank located beneath the cowl to a Carter carbureter. A complete Entz-Dyneto starting and lighting system in connection with a Willard 80-ampere-hour battery is part of the standard equipment.

The three-speed gearbox is located amidship and the drive is taken through a semi-floating axle. The wheels are wire, with clincher rims and quarter-elliptic springs are used all around.

HERFF-BROOKS

Streamline bodies the line's feature

NEW streamline bodies on both the \$1,100 four and the \$1,375 six will strike the average observer as the most important change in the cars being shipped from the Herff-Brooks plant in Indianapolis, Ind.,

The substitution of the new bodies for the previous type has effected a complete transformation of the cars, giving them a desirable snap, characteristic of many foreign designs.

Aside from improvements in the direction of body lines the concern has fitted a number of new features. The steering wheel of both cars now is of the folding-down type, being hinged to the post on one side. When desired it may be folded back so that entrance and exit from either side of the car is unobstructed. Right drive and center control gives way to left drive and center control.

The five-passenger car now is seen with an additional seat for a sixth person, this chair being of the folding type and its place when not in use is in the tool box under the front seat. Carburetion is by a Stromberg instrument instead of the device installed in the preceding models and Bosch ignition has forced out the magneto and dry cells of last season's cars. Apeldo cranking and lighting becomes a feature instead of the make used heretofore and a one-man top covers the passengers instead of the older type.

In the way of mechanical changes in the four chassis, aside from the controls mentioned above, the increase in wheelbase 2 inches to 118 and the increasing of the bore from $4\frac{1}{8}$ to $4\frac{1}{2}$, are the important ones.

The six motor is an L-head with separately-cast cylinders 4 by $4\frac{1}{2}$. This method of casting calls for a rather long crankshaft and hence more than the usual number of supports. In this engine seven bearings are used. Power is passed on from the motor to an inverted-cone clutch equipped with a brake and then to a three-speed gearset redesigned slightly to care for the central control.

The four-cylinder Herff-Brooks has a larger motor as mentioned before and the cylinders are block-cast, L-head design and equipped with same accessories as the six. Running gear units are the same in design also.

HUPMOBILE

Larger and more powerful new car

AN entirely new car at \$1,200 has been brought out for this season by the Hupp Motor Car Co., displacing the Hupmobile of 1914. It is larger and more powerful and there is hardly a feature that is not new.

This season marks the entry of the Hupp company into the ranks of left drive and center control users. The wheelbase of the chassis has been increased from 106 to 119 inches. The bore has been increased $\frac{1}{8}$ inch, making the dimensions of the power plant now 3.375 by 5.5. The waterjackets are larger, the valve diameter increased, connecting rods much longer, bearings made larger, ports wider and the manifold entirely different. While the Zenith carbureter still is employed it now is horizontal instead of vertical, and 1.25, instead of 1-inch size.

While the Westinghouse outfit still is used it is a single-unit instead of a double-unit system. The magneto has been dropped and in its place the Atwater Kent distributor substituted. With the fitting of the new distributor many exterior features of the motor have been altered. A new fan bracket with a tension coil spring is an example.

In rearranging the motor the drive of the camshaft has been moved from the rear to the forward end. The oil filler has been moved back to accommodate the new position of the carbureter and while the oiling system has not been altered so far as the motor is concerned, it is now arranged so that it does not feed to the gearbox, the object being to use a heavier lubricant at this point.

The clutch is the same in principle as in the last model, but has been completely reversed, the purpose being to put the thrust drag on the gearbox rather than on the motor when slipping the clutch. The diameter of the clutch remains the same at 13 inches, but the number of plates has been increased by four. There are now thirteen. Just back of the clutch is a new chassis frame member, which acts as a stiffener and carries the pedal shaft. The entire rear axle is new and the body larger, with streamline form. The spring suspension is now semi-elliptic all around, instead of the cross rear spring.

INTER-STATE

Offering is four-cylinder touring car

INTER-STATE is marketing a four-cylinder chassis with a touring body. This is one of the concerns which has turned its attention to touring bodies alone and makes roadsters only on special order. This is an entirely new model for this season. It has its 3.5 by 5 cylinders cast in single block and in place of the L-head design used on the six, marketed last year, now has the valve in the head.

Last year's six had 4 by 5 cylinders, but this concern is among those who have pinned their faith to the smaller fours this season. In fact, the motor has a number of tendencies towards what is becoming average American practice. The bore and stroke are almost identical with the average of the dimensions of all American cars. Thermo-syphon cooling is used. This is another change from the methods used on the six, as this had pump circulation.

Another change is in the ignition system, which now is single instead of the double type used previously. Lighting and starting is by electricity, but the manufacturer of this has not as yet been announced.

While a disk clutch was used for the six, a cone clutch delivers the power to the gearset in the four. A complete change in the rear construction and transmission system has been made. While in the six a unit power plant was employed, and the gearbox four forward speeds, a cone clutch is used in the four and three-speed gearbox

is incorporated with the rear axle. Instead of the drive being taken through the springs, it is now through a torque tube. The rear axle is three-quarter floating, whereas in the six it was floating. The wheelbase of the new car is 110 inches and is fitted with 33 by 4 tires. The six had a wheelbase of 132 inches, with 36 by 4.5 tires.

IMPERIAL

Four-cylinder feature of line

ONE four and two six-cylinder models are the 1915 representatives of the Imperial Automobile Co., Jackson, Mich. The four is the feature of the line, being designated as model 64-four and listing at \$1,085, or \$415 lower than the previous four-cylinder car. The 56-six, for which \$2,200 is asked, also is a new model, while the other six, model 44, is practically a continuation of the same model of 1914, though considerably refined and having a streamline body.

The four has a 115-inch wheelbase and 3¾ by 5 Continental L-head block motor. Gray & Davis cranking and lighting, thermo-syphon cooling, cowl fuel tank and streamline body with sloping bonnet and rounded-top radiator are other features.

The cowl fuel tank is new to Imperial practice. Ignition is by Atwater Kent Unisparker. The gearset forms a unit with the engine, while the drive finds its way through a multiple steel-disk clutch and uninclosed drive shaft of double-universal type. This latter is a departure from preceding Imperial four-cylinder practice, the shafts heretofore being in torsion tubes. The rear axle is floating and 12-inch brake equipment is supplied along with 32 by 3½-inch tires.

In the new six, Imperial has brought out a car of exceedingly trim lines. Mounted on a 130-inch wheelbase, the car is driven by a 3¾ by 5¼ Continental unit power plant, the cylinders of which are in threes, and valves all on the right. Centrifugal pump cooling, North-East cranking and lighting are used. The clutch is a disk-type and drive through shaft inclosed within a torsion tube. The rear axle is floating. The fittings include 36 by 4½ tires, and Stewart vacuum fuel feed from 20-gallon rear tank.

The other six, model 44, carries the same motor and practically has the same drive features as the six mentioned above. Its wheelbase is 126 inches, and the five-passenger body is somewhat similar to that mounted on the other six chassis. The inclosed drive shaft gets its power through a disk clutch and three-speed gearset. This car also has a North-East system.

JACKSON

Only two models, four and six

JACKSON cars, product of the Jackson Automobile Co., Jackson, Mich., are made in only two models, a four and a six. These supersede the three-car line of the

previous season, and are really not continuations of any of them. The Olympic small four, the Majestic larger four and the Sultanic six, the three 1914 representatives, have retired in favor of the 48-six and the Olympic-46. The latter, mechanically, is somewhat similar to last year's Majestic, having about the same motor as that model carried. With the popular streamline bodies and sloping cowls and hoods, the prices are \$1,650 for the six, and \$1,375 for the four. The former six sold at \$2,150 with five-passenger body, and \$2,300 with seven-passenger, while the fours of last year were priced at \$1,385 and \$1,885.

As compared with the Olympic of 1914, the new car bearing that name has a 2-inch longer wheelbase—117 inches. Its motor also is larger, being a 4½ by 5¼, whereas the old car had a 4½ by 4¾ engine. The L-head cylinders are in pairs and the gearbox is in unit. Instead of having gearshift and control levers on the left, as in the older model, the center position has been adopted, drive being still on the left. Another change is the use of the Stewart vacuum system of fuel feed, replacing a cowl tank type. The reservoir is now at the rear of the chassis.

The new four has Auto-Lite starting and lighting, the cranking motor being mounted same as last year—vertically at the front of the engine, driving through an inclosed chain and ratchet construction. Final drive is through a propeller shaft of the inclosed type to a floating rear axle, and the distinctive Jackson spring suspension using elliptics all around still is adhered to. Tires are 34 by 4.

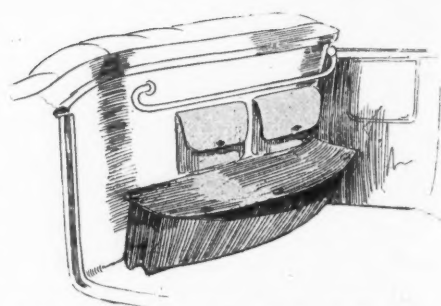
The six, with its 3½ by 5 Northway motor, has 48 horsepower. The engine details are block-cast cylinders with upper half of crankcase in unit. Three detachable cylinder heads are used, each covering two cylinders. The gearbox is in unit with the engine.

Deleo combination ignition, lighting and cranking is used, while other specifications include cone clutch, open drive shaft fitted with two universals, floating rear axle, elliptic springs all around and 34 by 4½ tires. Unlike the four, the gasoline tank is in the cowl and feeds by gravity to the carburetor.

JEFFERY

Two sizes besides the four

CONTINUING its four-cylinder chassis practically unchanged, the Thomas B. Jeffery Co., Kenosha, Wis., has added two new sixes, one called the Chesterfield, at \$1,650, and the other the Chesterfield big six at \$2,400. The former incorporates many new features, such as worm-drive axle, cantilever rear springs, Empico speedometer drive, Stewart vacuum fuel feed and three-plate dry disk clutch, in place of the cone which the company has been using on the past season's models. Another feature in this model is the use of a Daimler leather universal between clutch



Pockets attached to the back of the front seat on the Jeffery Chesterfield six

and four-speed gearbox. The use of a leather joint is somewhat new in America, but is a tried-out European feature, having been in use for several years by the Daimler company on its English cars and by the Isotta company.

The Chesterfield big six in general appearance of the body is like the smaller six, but the chassis construction is different, being almost the same as that of the model 96 marketed through the past season. However, the wheelbase is 133½ inches, the motor cast in pairs, 3¾ by 5¼, and is fitted with Bosch independent system and Stewart vacuum fuel feed. A dry disk clutch also is used on this model.

The smaller Chesterfield uses a small high-speed motor, 3 by 5, with its cylinder and the top of the crankcase a single casting. The cranking and lighting system is of Bijur make, and consists of generator and cranking motor, assisted by a Willard battery.

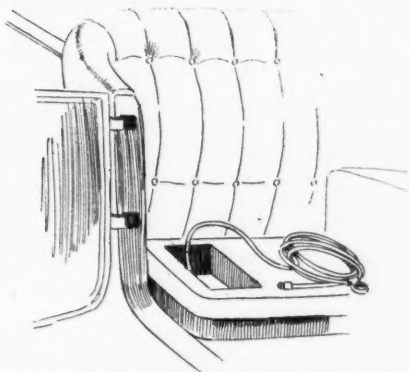
Between the motor and the four-speed gearbox is a new three-plate dry-disk clutch, the shaft of which is fitted with a Daimler leather universal. From the gearset, transmission is by a Spicer-joint shaft to an over-type worm gear driving a floating axle. The Chesterfield has a 122-inch wheelbase and is fitted with 34 by 4 tires.

KEARNS

Truck concern in a new field

THE Kearns Motor Truck Co. has entered the passenger car field with a light four-cylinder car. This model which was brought out late last season has been lengthened from 90 to 105 inches and instead of offering an option of 44 or 66 inches tread, only the standard now is manufactured. To take care of the heavier body and chassis necessitated by the longer wheelbase, the motor has been increased from 2.75 by 4 to 2.875 by 4.5. Unit power plant scheme, however, with three-point suspension is continued.

In general this car might be said to be typical of the small-car design which has become popular in the last season. In line with general practice on cars of this size, single magneto ignition is used, thermo-syphon cooling and gravity fuel feed. Head and tail lamps are electric and there are no side lamps. Fuel is fed to the carburetor by gravity from a 7-gallon gasoline tank. The disk clutch transmits the



Tire inflating hose on the Jeffery is kept under the front seat in a small compartment. The pump always is ready for use

drive through a three-speed sliding gear-set to a three-quarter floating rear axle mounted on ball bearings. The brakes are on the rear wheel and steering and control is optional, the wheel being placed on either the left or right side. Either a two or four-passenger body, both of roadster lines, are placed on this chassis.

KING

Eight-cylinder included in line

THE King Motor Car Co., Detroit, came into the limelight late in the fall with an eight-cylinder car selling at \$1,350 with attractive type of streamline body. This motor, which is of the V-type with cylinders mounted on the crankcase at 90 degrees to each other and in blocks of four, has a bore of $2\frac{3}{4}$ and a stroke of 5, the S.A.E. rating being 24.2 horsepower. The engine weighs little more than the four-cylinder King and has practically the same length overall. Due to these features it is installed in nearly the same chassis as that used for the four.

The four-cylinder model, which has been forced into the background, so to speak, by the newcomer, is much refined as compared with the previous year's car and sells for \$1,165 with full electric features for starting and lighting, a reduction of \$30 over the previous car so fitted.

This eight-cylinder engine is the second to be installed as standard equipment in an American car, and it is commendably designed for lightness, compactness and accessibility. All valve tappets are readily reached for adjustment, which is accomplished by eliminating nearly everything from the space between the two four-cylinder blocks, the center lines of which are at 90 degrees to each other. The crankshaft is the same in design as that used in a four-cylinder motor, this being possible due to the coupling of the two connecting rods to each throw bearing. One rod has a yoked end which grips the outer ends of the bushing, while a small-end rod goes between the two parts of the yoke. The bushing is pinned to the yoke rod with which it oscillates with the shaft as its bearing. The inner rod is free to move on the outer surface of the bushing.

The camshaft is directly above the

crankshaft and driven by silent chain. Each cam operates two opposite valves through rocker arms with rollers bearing against the cams. These rockers are pivoted to the crankcase. The crankcase, being common to both sets of cylinders, is not much heavier than that of a four, while reciprocating parts have been made as light as possible so as to allow for moderately high-speed operation.

A spiral gear drive from the camshaft operates the ignition distributor set at the front end of the space between the cylinder blocks. Cooling is of thermo-syphon type and lubrication by force feed from the oil base to the main crankshaft bearings, thence through drilled holes in the shaft arms to the rod bearings. The oil thrown from these lubricates the camshaft and other parts. The oil pump is driven by the same silent chain which runs from the crankshaft to the camshaft.

The four-cylinder motor is slightly increased in bore from $3\frac{3}{8}$ to $3\frac{1}{2}$ inches, the stroke remaining at 5 inches. The general construction of the engine has not been altered, however. It is a block-cast, L-head design.

Both powerplants incorporate the gear-set in unit and are supported at three points. Ward-Leonard lighting and starting by two units is used with both engines.

The wheelbase of the King chassis, which is much the same for both cars, is 113 inches and the rear spring suspension is of the characteristic cantilever construction which was first used in this country on King cars. The clutch is a multiple-disk running in oil. The drive is through an inclosed propeller shaft to a floating rear axle, the housing of which is of pressed steel. Left drive and center control are employed, and tires are 33 by 4.

KISSELKAR

One new six, one improved and a four

A NEW \$1,650 six known as the six-42 has been added to the line of the Kissel Motor Co., Hartford, Wis. Of the two other cars in the line, the four-36 and 48-six, the former has been reduced in price from \$1,850 to \$1,450, but the six-48 price is unchanged at \$2,350. Two-door touring bodies are being fitted to all the chassis which in the case of the improved models show some mechanical changes.

The model 36 now has a block-cast $4\frac{1}{4}$ by $5\frac{1}{2}$ motor instead of a $4\frac{1}{2}$ by $5\frac{1}{4}$ pair-cast engine. Magneto ignition has been dropped and the combination Westinghouse cranking, lighting and ignition adopted. Stewart vacuum fuel feed is used instead of pressure, the tire size reduced from 35 by 4 to 34 by 4, the gear ratios have been altered and the camshaft drive by helical gears instead of silent chain.

The new six-42 has a 126-inch wheelbase and is fitted with a block-case, L-head $3\frac{5}{8}$ by $5\frac{1}{2}$ motor cone clutch, three-speed gear-set and 35 by $4\frac{1}{2}$ tires.

The unique feature of the Kisselkars is the employment of a two-door single-com-

partment body as standard. The arrangement is made possible by using individual chairs in the driver's compartment, which permits the use of a single door 26 inches wide, on each side of the body, giving entrance to both front and rear seats. This arrangement introduced by the Kissel company, gives an unusual smart appearance to the car and with the better lines obtainable will gain favor over the fore-door type, is the belief of the company. The streamline idea is worked out to a nicety in this body job and an uninterrupted surface obtained from the radiator top to the center of the car. In order to make access to the front seats from the rear easy, an aisle 8 inches wide is placed between the forward chairs. Side lamps are dispensed with. The design of the body is used on the four and five-passenger cars and to those preferring the conventional fore-door type, a five and seven-passenger also are offered.

The six 48 power plant consists of a 4 by $5\frac{1}{2}$ block motor, cone clutch and four-speed gearset with direct on third. Unusually large valves are used and the push-rods clamped inside the valve inclosures. Instead of being pressed into the cylinders, the guide and rod can be removed easily without lifting the cylinders. Lubrication is by force feed through a drilled crankshaft, the oil being supplied from a self-contained reservoir and is drained back from the pistons to prevent smoking. This engine is built entirely in the Kissel shops.

A feature of the clutch is that it may be adjusted without disturbing any other part. Centralization of all electric wires on a control panel fastened to the front of the dash is another decided feature and through this arrangement the wiring may be repaired or inspected without disturbing parts foreign to the system. The system makes body removal possible without cutting a wire.

The four-cylinder Kisselkar, the principal data of which was given previously, has a 121-inch wheelbase, and is fitted with the two-door bodies described. The clutch is a cone and the gearset a three-speed selective, the power plant being lighter than that of the model 40 of last season.

KLINE

New L-head type six motor

TWO sixes mounted on chassis which are the same in every detail with the exception of the wheelbase will make up the Kline line. These chassis are known respectively as 6-42 and 6-42-A. On the former there are mounted a touring, toy tonneau and roadster bodies, and on the latter a seven-passenger touring and a seven-passenger limousine. The wheelbases are respectively 123 and 127 inches.

The new six motor is an L-head. The three-point suspension scheme heretofore employed by the Kline company has been changed. The pivot point was formerly at the flywheel, but has now been changed to the front on account of the change to

the unit power plant. The radiator suspension has also been changed from the main side members to studs placed in the bottom of the radiator. This was done to relieve the strain due to the twisting of the side members.

A four-speed gearset was formerly used, but now a three-speed takes its place. The reason advanced for this is that the new motor is more flexible and more powerful and the direct drive is quieter than the over-geared drive.

The electric starting motor has been changed to the left side of the engine and an inclosed Bendix gear fitted. The lighting generator is now on the right side and is driven by the pump shaft at 1.5 crankshaft speed instead of 3 to 1. The Stewart-Warner vacuum feed has replaced gravity feed for the gasoline and in body work a streamline design of rounded radiator and hood is another innovation. The entire electric equipment is taken care of by Westinghouse, in conjunction with a Willard battery. The cars on the 127-inch chassis have 35 by 4.5 tires, and on the 123-inch chassis, 34 by 4.

KRIT

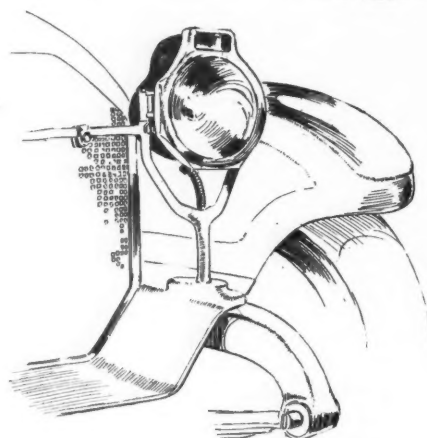
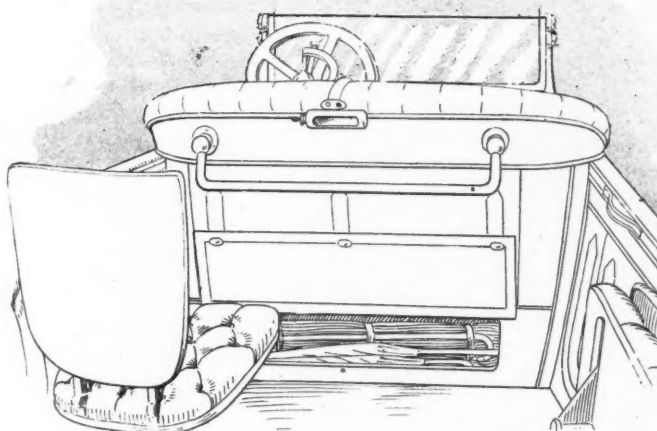
Price ranges from \$850 to \$1,295

KRIT models have a standard chassis and range in price from \$850 to \$1,295, the latter being for the cabriolet, a new model for the season. The special touring and roadster models of 1914 have been continued and are listed at \$1,070. They have five wire wheels and leather-faced seat covers as special equipment. The roadster and touring models, now listed at \$995, were sold at \$1,050 in 1914. They have the North-East electric starting and lighting system, non-skid tires, one-man top and other extras. The new \$850 model differs from the higher-priced models only in that it has not as many luxurious accessories, no one-man top, or crowned fenders or gasoline gauge, but all other necessary equipment and the Disco starting and lighting system.

One of the features on the higher-priced bodies is that there are no moldings along the top edges, the metal of the sides coming over the top edges in a neat, smooth curve. All bodies are of the streamline design. The Krit motor is an L-head block type, 3¾ by 4. About 25 per cent has been added to its power by increasing the valve size from 1¼ to 1¾-inch diameter, by lightening the reciprocating parts, and by redesigning the cams for wider valve opening and closer tappet adjustment. A new oiling system has been incorporated which combines the flywheel pump system heretofore used along with pump circulation, making it more positive and efficient.

Three chassis changes are of special note. First is the shifting to center from left control. Second is the adoption of fore and aft steering mechanism to replace the cross-type, this relieving the frame of the steering side thrust and therefore making steering easier. The third change is

The Locomobile has a compartment in the back of the front seat so that umbrellas, etc., may be placed into it, and so not interfere with the comfort of the tonneau passengers



Headlights on the 1915 Locomobile incorporate a small lamp above the regular one, the smaller being used for city driving

in the center frame cross member, which now houses the brake cross rods and levers, relieving them of twisting strains.

The Krit gearbox is in unit with the engine, the propeller shaft is enclosed in a torsion tube, and the rear axle is semi-floating.

LAMBERT

Slight change in two fours

THE Buckeye Mfg. Co., Anderson, Ind., is continuing for 1915 two four-cylinder friction-drive Lambert chassis, one with a 117 and the other with 112-inch wheelbase; with few changes. These cars are practically the same in design and while fitted with the same friction-drive design which the Lambert has used for many years past, the suspension of the jackshaft has been changed slightly so as to make a more accessible construction.

Bodies for 1915 are entirely new, being of the streamline type with higher sides than formerly and a much wider rear seat. Attention has been paid to the upholstery to obtain more comfortable riding. Instead of using dash lights as heretofore a small lamp is incorporated in the headlights.

Battery ignition, employing the accumulator of the lighting system, is used instead of a magneto. This feeds through a distributor. The electrical system still is of Briggs make.

The cowl gasoline tank has been made larger and the filler neck placed inside the cowl instead of on top outside. Other changes in Lambert cars include the fittings of a ball on the shifter lever to make speed changes easier and the adoption of a steering post, which, in the course of construction can be varied in length to suit the requirements of the purchaser.

The large Lambert chassis is fitted with either Continental or Rutenber motor, 4¾ by 5¼, and sells for \$1,565 with roadster or touring body. The drive is by friction set and single silent chain to a semi-floating axle.

The 112-inch wheelbase model is fitted with optional motor but the size is 3¾ by 4 and the price \$1,200.

LEWIS

Only one chassis, that a six

THE single six-cylinder chassis manufactured by the L. P. C. Motor Co., Racine, Wis., and called the Lewis, shows practically no change insofar as the essential construction is concerned, but the equipment has been altered by the adoption of the Remy electric cranker in place of that used last season and the fuel feed is now by the Stewart vacuum system. Battery ignition supplants the magneto used formerly. Body lines have been improved upon and the radiator rounded slightly and a one-man top has been added to the equipment.

As a feature of this car, which sells at \$1,500, the motor comes in first place. It shows marked tendencies toward foreign design, which no doubt is due to the fact that it was laid out by a French engineer practicing in this country. Its dimensions are 3½ by 6 and the crankcase and cylinders are cast as a unit. Two other units form the principal motor parts, the cylinder head, which is bolted on, and the crankcase cover plate. The assembled job gives a decidedly neat appearance, clean, accessible, and shows forethought in the positioning of the fittings. The magneto is set transversely on the left side of the motor in front, the breaker-box and distributor facing the outside, so that adjustments can be made easily.

In the lubrication of the Lewis motor the combination splash and force feed is employed and not only is the motor properly supplied, but the reservoir takes care of the clutch and gearset as well, replenishment being by flywheel, which acts in the capacity of a pump. The lubrication has been carried a step farther and the entire valve mechanism, including springs, guides, etc., are housed within the crankcase walls so as to receive proper oil supply by splash, so reducing wear on these parts considerably.

The clutch is a running-in-oil disk, the gearset a three-speed selective, the wheelbase 135 inches and the tires, 36 by 4, are mounted on Detroit demountable rims.

LOCOMOBILE

Two sizes of last year continued

TWO sixes comprise the Locomobile line. They are continuations of the 38 L-D and the 48 L-D of last season with refinements which are principally found in the body and equipment. The two right drive cars built last season have been discontinued, leaving only left drive cars.

The adoption of the single wiring Westinghouse electric light and starting system with a special push-button control switch designed by the Locomobile engineers is the chief refinement. With this control starting has been reduced to the pressing of a button, the shifting of the starting gear being accomplished electrically through a solenoid instead of manually. All the electrical push-buttons are now placed in a vertical row on the instrument board and the starter button being at the bottom may be operated by the foot. Other refinements include the use of drop forging for many of the small parts such as windshield brackets, bonnet clips, throttle levers, etc. The top is provided with a lining concealing the bows, and in the interior work the decorative scheme has been considerably improved. The fenders are more heavily crowned and are made in one piece, the brakes are 2-inches larger in diameter and the tread has been widened to the standard 56 instead of 54.5.

The two motors for the 38 and 48 are similar in design and do not depart from Locomobile practice of the last two years except that when the company changed to left drive last season the alterations necessary in putting the steering column on the other side of the motor had to be made. Both motors have T-head cylinders cast in pairs. The sizes are respectively 4.25 by 5 and 4.5 by 5.5. The makers claim horse power output of 63 and 82 at 1,800 r. p. m. In the body work luxury has been the keynote of design and the roadster is featured by a rear deck with a folding compartment containing extra seats for two passengers.

LEXINGTON

Prices increased; a new six

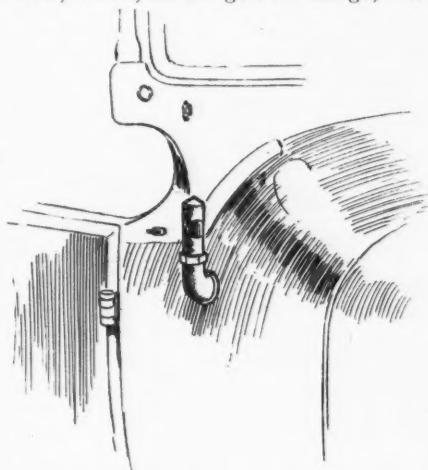
THREE Lexington cars are on the 1915 bill of the Lexington Motor Car Co., Connerville, Ind., the leader being a new

six selling at \$1,875. As factory mates the concern offers a four-cylinder model, increased in price from \$1,335 to \$1,375, and a six, larger than the new car, selling at \$2,575, an increase of \$200 over the 1914 figure. The price increases have been necessary because of many improvements made in the continued chassis.

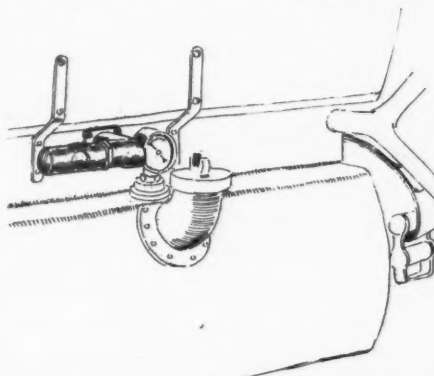
The four-cylinder now is equipped with a Teetor T-head motor, 3½ by 5½, instead of the L-head used the past season and whose dimensions were 4 by 5. Cantilever rear springs supplant the three-quarter elliptic of the older model; Westinghouse cranking, lighting and ignition replaces the formerly-used system; the gasoline tank has been moved from under the front seat to the rear and the feed now is by the Stewart vacuum system, instead of straight gravity; a one-man top and power tire pump have been added to the equipment and an entirely new body has been fitted.

The large six-cylinder model has not received as many mechanical changes as the four. The gasoline feed now is by the Stewart vacuum system, and the main tank at the rear, instead of under the seat; a power tire pump has been added to the equipment list and the body much improved. The hood now slopes from the windshield and the instruments are on a cowl. Aside from the changes mentioned the large six is as it was the past season.

Much interest centers about the new model, which, in its general design, with



Type of dash lamp used on the Marmon cars



The air-pressure gauge on the fuel tank of the Marmon can be read easily because there is a small lamp near it

the exception of the motor, is like the four. The engine is an L-head block, 3½ by 5, and is fitted with the Moore multiple exhaust system, as are the other motors used in Lexington cars. In this system the exhaust manifold is sectionalized, so that the gases have free passage to the pipe, and so an increase in power is obtained. Westinghouse cranking, lighting and ignition are used on this new model. Its wheelbase is 128 inches and the essential chassis units aside from the motor, are: a disk clutch and three-speed gearset bolted to the motor crankcase and a three-quarters floating rear axle with a ratio of 4 to 1. Rear suspension is by cantilevers.

LYONS-KNIGHT

Sleeve-valve motor talking point

THE Lyons-Knight Co., Indianapolis, Ind., is marketing its four-cylinder model K at \$2,900 in practically the same form as it was in 1914. The price given is that of the five-passenger car, the seven listing at \$2,980, the sedan at \$3,900, and the limousine at \$4,300. Roadster models also are built but only on special order.

Aside from its sleeve-valve engine the feature of this car is the worm-drive axle incorporating the gearset, the only car on the market using this combination. The worm is mounted above the worm wheel and despite this arrangement the clearance is 10 inches.

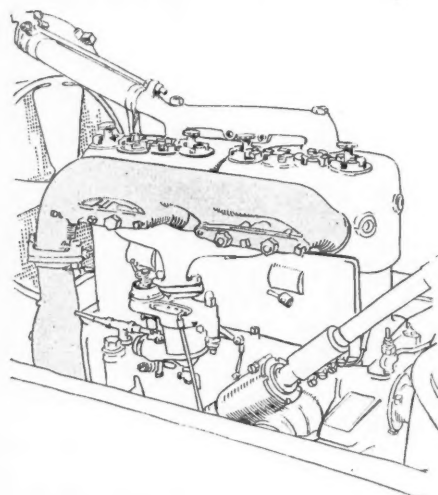
The motor is a 4½ by 5½, with pair-cast cylinders and aluminum is used freely, being applied to the crankcase, cylinder-head covers and chain case. The covering for the cylinder heads is designed to keep out dirt and moisture and protect the spark plugs, this being exclusive with the Lyons motor. The sleeve-valve arrangement is in accordance with the usual Knight design, but the lubrication system is an attractive feature. Force feed is used for the sleeves, all bearings and pistons. A plunger pump controlled by one of the eccentric rods, takes oil from a reservoir in a pump in the crankcase and forces it under pressure to the crankshaft and eccentric shaft bearings, the eccentric rod bearings and then through a duct in the crankshaft center to the connecting rods. These rods are hollow and the oil is forced upward in them to the top rod bearings, thence to hollow piston pins to the piston exterior and through holes in the sleeves to the cylinder walls. The oil pressure is in proportion to motor speed.

A single-unit North-East cranking and lighting device is connected by silent chain to the front end of the crankshaft. A three-plate dry-disk clutch and three-speed selective gearset take the motor drive. The wheelbase is 130 inches.

MARMON

Again two sizes offered

TWO sixes as heretofore comprise the Marmon line. No changes have been made in the larger, which is known as the



In the Mitchell cars the exhaust manifold discharges at the front instead of at the rear end. The draught from the cooling fan helps to reduce the pressure in the exhaust pipe and the heat is kept away from the driver's seat

48, and the smaller is a continuation with refinements of last year's car under the name of model 41.

By far the most radical change is in the equipment. The Marmon was the first to adopt the full Bosch outfit. There is a Bosch magneto, starter and generator, all in separate units, and in addition all the switches, wiring, lamps, bulbs, etc., are of Bosch manufacture.

The smaller of the two sixes is a more attractive job than its predecessor, in that the body lines have been considerably beautified. The sides are higher than last year, while a sloping hood and rounded radiator are employed. The fenders have been given a different camber and the luggage carrier and battery box have been removed from the running board, leaving these free and clear.

A few motor changes have been made, because a new lighting, starting and ignition system has been fitted. In order to avoid running the magneto shaft through the pump, the latter has been moved forward. Pistons this year are longer, with three rings above the wrist pin. The upper two are concentric packing rings and the lower a concentric oil ring with nine .125-inch holes drilled around the circumference at an angle of 45 degrees to the axis of the cylinder.

The starting motor engages with a gear connected with the flywheel. In previous models the Marmon starter installation was by means of a chain drive in a separate housing in the rear of the motor. A new design of clutch is used for this season. It is a cone faced with Thermoid. The Stromberg carbureter, Silvertown cord tires, one-man top, and larger brake cams are features of the new car. The 4.25 by 5.5 L-head power plant with cylinders cast in threes is continued. On this chassis there is a five-passenger body at

\$3,250, roadster and speedster at the same price, and in the more expensive bodies there is a seven-passenger touring design at \$3,350.

METZ

Appearance improved; equipment bettered

IMPROVING the appearance and bettering the equipment has been the extent of the changes made in the Metz for this season. As far as mechanical changes are concerned, none has been made except those necessitated by a 6-inch increase in the wheelbase. The gasoline tank now is in the cowl and a gravity gasoline feed from this point is used.

The friction drive which always has been the leading characteristic of the Metz car remains unchanged, the drive being taken from the friction disks through a jackshaft and side chains to the rear wheel.

The L-head 3.75 by 4-inch motor is cast in block and is of clean appearance with inclosed valve action. The crankshaft and camshaft are steel forgings, ground to a finished fit and carried in white metal bearings. The motor is lubricated by a constant level splash with pump circulation. Cooling is by thermo-syphon and ignition by a single Bosch high-tension system.

The frame is of pressed steel and the springs are full elliptic. The wheels are wood with 30 by 3 tires, and when the friction wheel itself is considered, there are three methods of braking the car as there are two sets of brakes, one on the rear wheels and the other on the jackshaft. All four wheels are carried on ball bearings.

METEOR

Six and a four the offering

TWO models, a four and a six, make up the Meteor line. Both these models with the exception of the power plants and wheelbases are constructed along the same lines. Both are provided with L-head plants with the cylinders cast in pairs and valves on the lift side. The dimensions of the four are 4 by 5, and of the six, 3.75 by 5. The six, although of smaller dimensions, has a higher power rating than the four, the actual figures, being 25.6 and 33.6 by the S. A. E. formula. The piston displacements of these two models are respectively 251.3 and 331.4 inches. The wheelbases are respectively 114 and 126 inches.

Pump water circulation is used in both these cars and lubrication is by a combined pressure and splash feed, in which the oil is carried from the reservoir in the crankcase by direct leads to each of the main bearings. The oil which flows from these bearings supplies the splash troughs, which are located beneath each connecting rod throw.

Electrical equipment for both cars is furnished by the Splittorf-Apple apparatus for starting and lighting and the Atwater Kent system for ignition. The battery is the sole source of ignition current and the control of the spark advance is either hand or automatic, as suits the driver. That is,

should the spark lever not be used, the automatic advance would take care of the spark position, but if desired, a change in advance can be made by using the hand lever.

Both models use disk clutches and three-speed gearboxes. Both clutches and gearboxes being combined with the motor to form a unit power plant. The final drive is by bevel gear, torque and drive being taken through the springs. Both cars have the same reduction gears in the rear axles, the final ratio being 3.7 to 1. The tires on the four are 34 by 4, and on the six, 35 by 4. The wheels are wood. The steering wheels are located on the left with the control levers in the center. The four and six are fitted with only one type of body, this being a five-passenger touring.

McFARLAN

Two sizes of motors offered

A CONE instead of a disk clutch, Stewart vacuum feed instead of pressure, option of electric cranking in place of the pneumatic, new body design, and an increase of 4 inches to 132 in the wheelbase are the chief changes to be seen on the McFarlan, the single six-cylinder chassis marketed by the McFarlan Motor Car Co., Connersville, Ind. However, the one chassis is fitted with either a 4 by 6 or a 4½ by 6 motor, the price with the former being \$2,590, and with the larger engine, \$2,900.

The motor is T-head, with its cylinder cast in block, and regularly is fitted with Westinghouse lighting and ignition system, but the Westinghouse cranking unit is given as optional to the pneumatic. A feature of the generating system is that the current output increases when the load on the battery increases, which is effective in keeping the battery charged at all times. There is not an exposed wire, flexible conduits being used for housing the conductors.

The new clutch is 16 inches in diameter and has twelve flat adjustable springs under the leather. The entire unit is comparatively light, peripheral weight reduction resulting in the stoppage of clutch spinning and hence making gearshifting easier and more quiet. The gearbox still has three-speeds and is in unit with the floating rear axle.

The body is lower than heretofore and the lines have been improved upon to quite an extent. There is a small cowl over the back of the front seat, which is practical for the carrying of parcels, gloves, hand-bags, etc. The upholstery does not extend over the body edge at any point.

MONROE

Roadster newcomer in industry

A NEW roadster has been announced by the Monroe company which, while a new concern to the industry, is closely related to the Chevrolet company through the possession of common stockholders.

The car is in the low-priced class, selling for \$460. It has a block motor with valve-in-head and in general lines resembles very much the Little car formerly produced by the Chevrolet company. The 3 by 3.75 power plant delivers the power through a 10.5-inch clutch to a three-speed gearset.

In spite of the low price of the car it is thoroughly up-to-date with its electric equipment; being fitted with electric lighting and for \$35 extra with electric starting. The generator is on the right side of the motor and is at the forward end, being driven from the timing gear. When the starting motor is fitted it is on the same side of the engine and engages with the flywheel by means of spur teeth. The engagement of the driving pinion of the starting motor is controlled by a Bendix gear.

Thermo-syphon cooling is used and the radiator is supplied with an auxiliary tank at the top. A belt-driven fan also aids in the cooling.

A combination splash and pressure system takes care of lubrication. The pump delivers the oil to the connecting rods, bearings and timing gears, and the cylinders receive their lubrication through the splash.

The rear axle is semi-floating and torque is taken through a tube connected to the rear end of the gearbox by a forked yoke. Steering is by a worm and gear with spark and throttle lever mounted under the wheel. The control instruments, such as the ignition switch, dimming switch and ammeter, are on the cowl board.

MITCHELL

New four and six models offered

TWO new cars, a four and a six, of design practically the same throughout, are featured by the Mitchell-Lewis Co., Racine, Wis., for 1915. The four is listed at \$1,250, and is the lowest-priced car this concern has turned out since 1908 and the cheapest touring car it ever manufactured.

The new six is a \$1,585 job with motor, gearset, rear axle and body design like the four. As selling mates to the newcomers the concern is offering the De Luxe six at \$2,350, and the special six at \$1,895. The four-cylinder model which sold for \$1,585 has been discontinued.

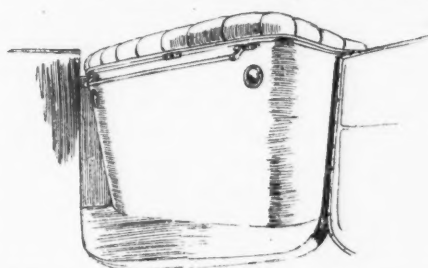
The motor size of the new four and six is the same and the design of the other chassis parts also, hence a description of the four will do for the six also.

The new four and six are the only 1915 Mitchells with a motor using L-head cylinders and these are 4 by 5½, cast in pairs. Light reciprocating parts and balance of parts has been given special attention so as to reduce vibration. The oiling system makes use of a plunger pump which forces oil from a reservoir in the crankcase to troughs under the connecting rods, to the timing gears, to the silent chain at the front of the engine and to the dash sight feed which has two outlets, one leading to

the clutch bearing through a flexible tube and the other to the rear crankshaft bearing. A breather arrangement from the crankcase to the valve chambers offers a means of valve mechanism lubrication by oil vapor from within.

Simplicity is seen in the fan and water pump assembly. A centrifugal pump operating at unusually high speed is mounted upon the front end of the fan shaft where it is accessible, close to the radiator, driven without extra mechanism and should the water within become frozen and injure the pump, the outlets are large enough to cool the engine by the syphonic system.

The exhaust manifold instead of discharging at the rear does so at the front which lessens the heat under the driver's seat and provides a cooling means for the



Odd location for a tonneau lamp. This is used on the Moline-Knight

exhaust pipe, it being in range of the cooling fan draught.

The drive from this motor is by a cone clutch of new design using a light, stamped-steel member with three steel coil springs under the leather to make engagement smooth. A three-speed gearset is bolted to the front end of a torque tube which incloses the drive shaft. Bevel final drive in a floating axle is used.

Insofar as design is concerned the special six and De Luxe six, the two continued cars are practically the same. The principal dimension differences lie in the wheelbase, which in the special six, is 132, and the De Luxe six, 144. The motors in both are 4¼ by 7, T-head jobs cast in pairs and using Remy ignition and Rayfield carbureter.

MOON

Continental motors on all models

TWO new cars, the 6-40, a Continental-equipped six, selling at \$1,575, and a four, model 4-38, constitute the additions to the line of the Moon Motor Car Co., St. Louis, Mo., while the six, model 6-50, also is much improved over the 1914 car. The entire line now is equipped with Continental motors, whereas last season a Moon-made engine was used on the four-cylinder model.

The 1915 cars show evidence of past Moon practice and the departures are in the nature of weight-reduction, improvements in obtaining better riding, new bodies, a new type of disk clutch, Hotchkiss drive, the adoption of Stewart vacuum gasoline feed and the fitting of a new rounded radiator.

The model 6-50 which was marketed in 1914 has a 130-inch wheelbase instead of 129, the doors are 22 instead of 21 inches wide and the upholstery has been made deeper and more leg room provided for the occupants. The disk clutch has been reconstructed and the method of holding the plates charged so that wear is reduced. A crucible-steel housing supplants the malleable iron one used previously in the rear axle, effecting a reduction in weight of something like 100 pounds. The brake drums on this housing are 2 inches larger in diameter than those of last year, which were 14 inches. A new brake-equalizing system is installed and the Delco distributor now is operated by silent chain instead of gears. To the equipment has been added a Stewart vacuum feed system and a Klaxon horn. The price is unchanged at \$2,250.

The two new cars are similar in construction and general appearance and should be admired chiefly for the excellence of the body design. The slope from the windshield to the new rounded radiator is an exceptionally long one, the back of the tonneau seems to run-in harmoniously with the rest of the car and the sides, fenders, etc., blended, showing that much thought has been given to improving the car externally.

The chassis features of both the 6-40 and the 4-38 are the same, but the former has slightly heavier parts. The motor dimensions of the four are 3¾ by 5 and the six 3½ by 5. An improved one-wire Delco system is used. As a unit with the motor is a dry-disk clutch and three-speed selective gearset, products of the Warner Gear Co., Muncie, Ind.

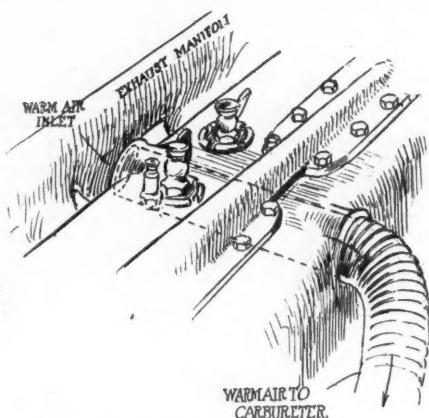
The propulsion is through the springs, constituting what is called the Hotchkiss drive, which eliminates the torque rod and makes the springs take most of the driving strains. A new braking system is used on these cars and the Moon company has reduced the number of brake-system parts from fifty to twenty-two. In the new system a more direct action from pedal to bands is obtained with a smaller equalizing beam at the rear, almost above the axle housing. Last season a long beam was used in the center of the chassis.

MOLINE-KNIGHT

Many mechanical changes made

MANY mechanical changes and an increase in price from \$2,400 to \$2,500 are to be seen in the four-cylinder Moline-Knight, manufactured by the Moline Automobile Co., Moline, Ill. This rise in price has come as a result of the adoption of a four-speed instead of a three-speed gearbox on the open cars. The closed cars still use the three-speed gearset.

At the same time, the new unit has made it necessary to abandon unit power plant construction on these cars, calling for four instead of three-point motor suspension. The separation of the motor and gearset has caused the elimination of magnified



On the new Monarch the carburetor air inlet is behind the exhaust manifold and the air passes through the cylinder casting and out on the other side to a flexible tube and then to the carburetor

gear noises brought about by the sound-ing-board effect of the rather large alu-minum housing formerly used. The re-construction also has called for a change in the position of the change-speed and emergency brake levers, both of which now are more accessible to the driver.

The rear axle bevel gears have been sup-planting by spiral bevels and a third change of importance centers about the motor ex-haust manifold. This no longer is water-jacketed and has been removed as an in-tegral casting, the present construction showing it to be bolted to the cylinders. The steering post formerly of the worm-and-sector type now is a nut and screw. Whitney chains are used for driving the motor shafting instead of the make of chain used formerly, and a new single-cylinder Stewart tire pump is used in-stead of the two-cylinder used on last year's Moline.

The Moline-Knight engine, 4 by 6, is the first block-cast Knight to be announced in America and one of the two offered this year. Thermo-syphon cooling is another departure from conventional Knight practice and this is the only motor so cooled. The water travels from the radiator through a two-arm manifold, through the intake manifold around the cylinder head and tops of the sleeves.

The oiling system also is interesting. A gear pump forces oil, at pressure up to 40 pounds, to every part requiring lubrica-tion. An automatic governor connected with the throttle regulates the oil pressure which is in proportion to the speed.

The Moline motor uses Bosch duplex ignition, a Schebler carburetor and the drive from the motor is by cone clutch and a new gearbox to a floating axle. The wheelbase is 128 inches.

MONARCH

A \$1,250 six the only model

THE Monarch Motor Car Co., which dur-ing the past year has marketed a four-cylinder touring car at \$1,000 and a smaller four at \$675, as well as a six at

\$1,400, has dropped all of these models, and is concentrating upon the production of another six, which is to be sold at the low figure of \$1,250, with complete fittings. This car, which is larger than any hereto-fore produced by the concern, has a wheel-base of 125 inches and is propelled by a standard Continental motor, 3½ by 5.

The engine is a block L-head and has the gearset in unit. The whole assembly is three-point suspended in the frame. Cooling is by centrifugal pump circula-ting system, while ignition is cared for by Atwater Kent arrangement and lighting and cranking by Ward-Leonard equipment. The cranking function is worked out through application of the turning effort to the flywheel through the Bendix drive mechanism.

Other design features include left drive and center control, Hartford cone clutch, springs under the leather, 13-gallon cowl gasoline tank, Salisbury three-quarter float-ing rear axle, wood wheels carrying 33 by 4 tires on demountable rims and elliptic rear springs, for which exceptional resili-ency is claimed.

The body is of full streamline type with sloping cowl meeting a bonnet of the same general slope, which has gills in the sides. There are no exposed door hinges or latches, and running boards also are clear. The price of \$1,250 is with five-passenger body.

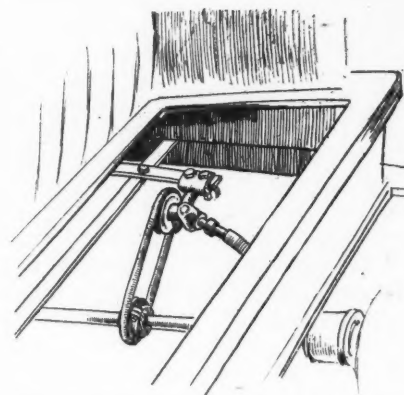
MAXWELL

Price reduction and redesigned body

WITH redesigned body of streamline type and new sloping hood, the Max-well 25, the only model made by the Max-well Co., has been reduced \$55, and now lists as a touring car at \$695. This price change goes through the whole line of bodies, the roadster now selling at \$670, the town car at \$920, and the cabriolet, which is a new body type, at \$840. For complete electric cranking and lighting equipment of the Maxwell company's make, \$55 is added to any of these prices, thus making the figures with complete electrifi-cation of the car the same as last year with gas and oil lighting and no starter.

Besides the new form of bodies, the gasoline tank has been shifted from under the seat to the cowl position, while an-other important change is the replacement of the semi-elliptic rear springs, which connected to spring horns at their rear ends, by three-quarter rear springs having scroll ends. On the motor, the carburetor has been shifted to the left of the engine to the right to make room for the electrical units when supplied. A new radiator con-struction is also used in which the shell is separate from the core, and any jar which the former receives is not trans-ferred to the delicate core, thus making less possibility of springing leaks.

One point which adds materially to the outward appearance is the use of the popular domed fenders which closely follow the curves of the wheels. The body



The speedometer on the Monarch is driven from the propeller shaft by means of a pulley and belt

is entirely smooth, and door latches and hinges are concealed. One other improve-ment is the addition of an instrument board which carries the usual array of con-trol devices as well as the filler cap for the gasoline tank.

The Maxwell has a 3½ by 4½ block, L-head motor with the three-speed gearbox in unit. The drive features include cone clutch, inclosed propeller shaft and three-quarter floating rear axle. Left drive and center control are used.

McINTYRE

A new four-cylinder model at \$695

WHILE the W. H. McIntyre Co., Au-burn, Ind., is manufacturing three cars for 1915, one of them, the four-cyl-in-der model 25, is taking almost the entire energy of the plant. This model which in five-passenger form lists at \$695 with com-plete equipment including an Apeldo elec-tric system, is the best-appearing job, which has up to this time, been marketed by the company. Its selling mates are the model 6-40 Hoosier and the Imp the Second, the reconstructed cyclecar which, however, shows little of the original car's design.

The 6-40 Hoosier was called the 6-40 Limited in 1914 and mechanically there has been but one important change made, that of transferring the steering post from right to left side. The price of this car has been reduced from \$1,685 to \$1,275 and a one-man top added to the equip-ment. The Imp model now has a four-cylinder water-cooled motor and a side-by-side body instead of two-cylinder engine and tandem body.

The new model 25 McIntyre is an ex-tremely well-appearing job and has a slope from windshield to a V-shaped radiator, which is longer than usual. The body is hung rather low and, on the whole, the car's appearance is slightly different from many of the streamline vehicles offered by the trade. The wheelbase is 106 inches.

A Golden, Belknap & Swartz motor, 3½ by 4½ with L-head, block-cast cylinders is used. Cooling is by the thermo-syphon system and oiling by force feed and splash in which a plunger pump takes oil from the crankcase and forces it through a dash

sight feed from whence it travels to the crankshaft bearings, overflowing and dropping again to the reservoir. The clutch is a three-plate running-in-oil type and drives by shaft to a three-speed gearbox. Rear spring suspension is by cantilevers.

NORWALK

One model dropped; another added

NORWALK has dropped one model and added another for this season. Last year two sixes were marketed, known as C and D. The model which has been dropped is the D, which leaves the larger six continued, and the new model F is a distinct departure from previous Norwalk practice. It is also a six, but instead of having the cylinders cast in threes, it uses block-cast construction. In all other respects the chassis itself is practically the same as the model D, but in the matter of outfitting, the single-wire system is used instead of the double wire, double-bulb headlights are used, instead of dash lights, and the electric gearshift is now regular equipment on the model C only.

The model F, which will be the leader for this season, has its six 3.5 by 5.125 L-head cylinders cast in a single block, with the crankcase continued back to include the clutch and four-speed gearbox forming a unit power plant. This plant is suspended at three points. The valves are all on the left side and are driven from a unit camshaft, which is operated by helical gears. The intake manifold is a unit with the cylinder casting and the exhaust separate.

Cooling is effected by a centrifugal pump through a cellular radiator. Lubrication is taken care of by a splash-pressure system, in which a gear pump takes the oil from a crankcase, sends it to the main bearings under pressure and from there it flows to the splash troughs beneath the connecting-rods. Ignition is accomplished by a single high-tension system, in which the battery is the current source, and an Atwater Kent distributor and coil, form the balance of the system. Gasoline feed is by the new vacuum system. Gray and Davis starting and lighting are used and the transmission system is composed of a disk clutch, selective gearset and semi-floating rear axle, which has a double-gear reduction. The drive is taken through the springs. The wheelbase is 131 inches and the tires 37 by 4.

NATIONAL

No changes in chassis models

NO change has been made in the National line as far as chassis models are concerned. The same four and six are continued. The four is the same mechanically as for last season and the six incorporates refinements which are principally details, though the wheelbase has been increased to 134 inches.

The chief change is the fitting of an entirely new electrical outfit comprising

the Eisemann magneto, which now acts as the sole source of ignition current, and the Westinghouse starting and lighting outfit, which replaces that formerly used. In refining the motor, 25 per cent has been cut off the weight of the reciprocating parts. The crankcase is heavier and more rigid and an improved type of oil screen has been fitted. In the gearbox, the travel of the sliding pinion has been increased .25-inch. Silico-manganese steel replaces carbon steel in the springs. Larger wheel bearings are used this season.

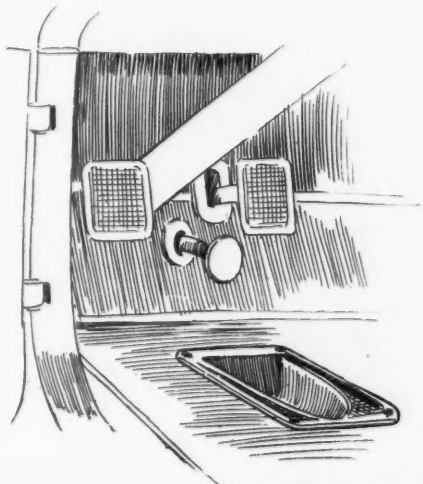
The power plant of the six is 3.75 by 5.5 L-head block design with water-jacketed intake manifold. Valve mechanism is inclosed. The newest Rayfield carburetor has been fitted in connection with a pressure-feed gasoline system. The four is a 4.875 by 6 T-head design with its cylinders in pairs.

In body work the National company is featuring a four-passenger boat design in which there are four individual seats mounted on tracks so that they can be placed about the body in any desired position. There is a fifth additional seat which folds into the rear end of the body. It is invisible except when in use. The entire body follows boat practice with a curved gunwhale line and moulded fore and aft curvature. The other standard bodies of this season have been brought thoroughly up-to-date and follow streamline practice. New bodies include a coupe, cabriolet and parlor car. The six sells for \$2,375 and the price of the four is \$2,750.

OWEN

Entz electric transmission used

R. M. OWEN has incorporated the Entz electric transmission in a six-cylinder chassis, which he is marketing for \$3,500 in seven-passenger touring and three-passenger roadster design. The feature of this car is the use of the electric drive, which replaces the clutch and gearbox. In the Entz system of electrical transmission, the patents for which are owned by the R. M. Owen company, a generator and a motor are combined in an un-



A depression in the floorboards of the National allows of the driver resting his foot when operating the accelerator pedal

usual manner. The casing of the generator, which carries the fields of whole pieces, is bolted to the crankshaft, replacing the flywheel. The armatures of the two machines are coupled together and their connecting shaft is permanently fastened to the drive shaft.

The speed of the car is regulated by the throttle in the customary manner, but the torque for different loads is varied by changing the field strength of the generator and on lower speeds, by sending the generated current to the motor. When the car is running along under conditions similar to high gear, for a mechanical-driven car, the generator winding is short-circuited on itself and therefore, with a slight amount of slipping the heavy current is generated. This current is of sufficient strength to create a magnetic attraction between the field and the armature equal to the torque required to propel the car at that speed.

The slippage varies with the torque, so that if a slight grade is encountered the difference will become slightly greater, thus increasing the voltage of the generator, which will, in turn, produce a stronger magnetic attraction and the torque will become greater. Seven speeds are provided.

The motor fitted to the new car is a six-cylinder, 3.625 by 5.5 I-head block. It is cooled by pump water circulation, oiled by pressure and has a Remy dual ignition system. The electric transmission is located amidship and final drive is obtained by bevel gear to a floating rear axle.

OVERLAND

Three models instead of one

THERE are three Overlands. These are a large four, model 80, which is a continuation of last year's model 79 with many refinements and is sold at \$1,075; a smaller four, model 81, new to the line and offered at \$850; and a six, the first ever turned out by the Willys-Overland Co., which is priced at \$1,475.

All three models have much the same general outward appearance, the bodies being of the present-day sloping hood type with cowls rounding down to the point where the bonnet begins. Although the six-cylinder motor does not conform to the general design features of the four-cylinder engines, the final drive system is characteristically and uniformly Overland in all three. The gearbox of the usual three-speeds is mounted in unit with the rear axle, and the propeller shaft is enclosed with a torsion tube having a yoked front end. The 1915 models are also the first Overlands to have left drive, though center control has been fitted on previous models.

One feature of note on the larger four and the six is the centralization of the electrical control switches in a box attached to the right of the steering column. 2 inches below the wheel. This carries the switches for all lights, for the starting

current and also for the magneto. All models have electric cranking and lighting this year at the prices given, and their equipment is unusually complete.

In the new six the motor is a $3\frac{1}{2}$ by $5\frac{1}{4}$, L-head, block type, new to Overland design. It is rated at from 40 to 50 horsepower. Valves are all on the right, compactly housed, and the cylinder head is removable, allowing for ready inspection of valves and pistons. This car utilizes the Stewart vacuum fuel feed system, the tank being placed on the front of the dash and making more positive the flow from the main tank, which is under the front seat. Wheelbase is 125 inches, tread 56, and rear spring suspension is three-quarter elliptic, with the springs underslung from the floating axle.

The smaller four carries a characteristically-designed Overland motor with cylinders cast separately of L-head design and 4 by $4\frac{1}{2}$ size. It develops 30 horsepower, and is suspended at three points in the frame. Its clutch is a cone, the rear axle floating and the rear three-quarter elliptic springs underslung from it. Wheelbase is 106 inches and tires 33 by 4.

The larger four, with a similarly designed engine of $4\frac{1}{8}$ by $4\frac{1}{2}$ size, has a greatly enlarged body as compared with model 79 which it succeeds, though the wheelbase is the same—114 inches. This greater roominess of body has resulted in larger seats, the rear now being 49 inches wide inside, while the front measures 40 inches across, and has a division between drive and passenger parts.

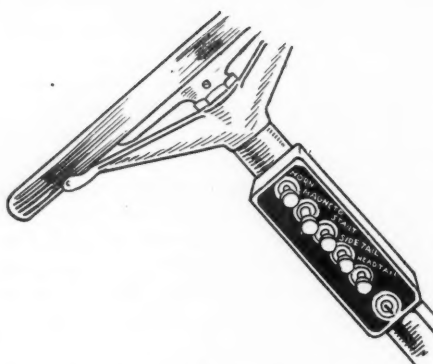
The starting and lighting system has been remounted so that instead of driving the engine through silent chain, the starter gears through teeth to the flywheel. By undersliding the rear springs and redesigning the front axle, the body of model 80 is $3\frac{1}{4}$ inches lower than model 79. This model also has cone clutch and floating rear axle.

Although only a touring body is at present offered on the six, the model 80 four has roadster and coupe bodies as well as the five-passenger, while a roadster is also fitted to the smaller four. Delivery bodies may also be purchased for these four-cylinder chassis.

OLDSMOBILE

Four-cylinder at \$1,285; also a six

THE Oldsmobile four and six are still with us. The former is reduced from \$1,350 to \$1,285 since it first came out, while the big six, which comes only in seven-passenger body, now sells \$175 cheaper than it did. The five-passenger body formerly fitted to the six chassis has disappeared. In outward appearance the six has been changed by sloping the body to meet the hood, which is also sloped. The four is nearly the same throughout as when first it appeared, but it now has a roomier body, giving more leg room. This has been accomplished by adding 3 inches to the rear of the tonneau.



The 1915 Overlands have centralized control of the electric switches. The lights, electric cranker, and magneto are controlled by the buttons on the steering-post box

Since it was first brought out, the four has had only one mechanical change, that being the shifting of the front axle 2 inches forward, making the wheelbase 112 instead of 110 inches. This brings the axle in line with the radiator instead of back of it, though it has no effect upon the body dimensions. The front spring length has been effected by the change also, these springs now being $35\frac{1}{2}$ inches long, $1\frac{1}{2}$ inches greater than they were. Easy riding is thereby augmented.

There is no alteration in the distinctive valve-in-head, block unit power plant, which is $3\frac{1}{2}$ by 5, and rated at 30 horsepower. The most unusual feature of this engine is that all parts of valve mechanism are inclosed. An aluminum plate goes over the rockers in the detachable head, while the long rods running up from the camshaft are in a housing integral with the cylinder casting. The Delco combination lighting, cranking and ignition system, which gears to the flywheel for starting and is driven from a shaft when operating as a generator, is employed.

The clutch is a cone type, a torsion tube incloses the propeller shaft, and the rear axle is floating. Tires are 33 by 4. The most striking part of the smaller Oldsmobile is the excellent finish which has been given it. The appointments and equipment leave nothing to be desired. Circassian walnut is used for the cowl dash and for the steering wheel, for example.

The big car has a 139-inch wheelbase, and the chassis has been hung $2\frac{1}{2}$ inches lower, which adds to appearance. The cooling system has been augmented by a larger radiator and bigger water jackets. The motor is $4\frac{1}{4}$ by $5\frac{1}{4}$, with cylinders in threes and gearbox in unit. The Delco electrical combination is used, as are cone clutch, open drive shaft fitted with two universals, floating rear axle and 36 by 5 tires.

OAKLAND

Body lines big talking point

IT is doubtful if Oakland could have hit upon more attractive design of bodies for its two cars than that of the 1915 four

and six. These bodies are really modifications of the boat styles appearing last year in Europe, and are true streamline designs. The four, designated an model 37, is a much changed continuation of model 35 of 1914, while the 6-49 is the new edition of the former 48, being reduced \$100 to \$1,685. The four remains at \$1,200. A new speedster at \$1,100 is a new design brought out and the chassis is the same as the 37 with the exception of the gear ratio.

With its motor refined, and its maximum speed increased; with completely redesigned frame; with new type of drive and the elimination of a great many brake-rod and lever bearings due to the use of special spring pivot mechanisms.

The motor is a $3\frac{1}{2}$ by 5 block casting with detachable cylinder head and gearbox in unit, and suspended at three points in the frame. Pistons have been crowned to make them stronger, multiple thin steel rings have been fitted to the pistons, the throttle axis of the carburetor has been arranged parallel to the center line of the motor so as to make less restriction to gas passage and valve diameter and lift have been increased.

Delco ignition, lighting and cranking are employed, as is the Stewart vacuum fuel feed with tank at the rear.

A tubular propeller shaft replaces a solid one; the three-quarter floating axle has given way to a floating construction; and the frame has been re-shaped so as to follow the body line and thus give substantial support. Underslung springs at the rear help the low-hung appearance.

The 6-49 is fitted with either roadster or seven-passenger touring body. The motor has the same improvements as the four, and is also a $3\frac{1}{2}$ by 5, with cylinders in block and heads detachable.

PAIGE

Six-cylinder running mate to four

CONTINUING the four-cylinder Paige 36 with practically no changes except a reduction from \$1,275 to \$1,195 and adding a six at \$1,395, which is of exceedingly attractive appearance, the Paige-Detroit company enters the 1915 year well equipped. The new six, the first to come from the concern's shops, is a luxurious car of advanced streamline type having a capacity for seven and mounted on a chassis of 124-inch wheelbase. Its motor is a $3\frac{1}{2}$ by $5\frac{1}{4}$ unit power plant type.

The body lines are somewhat on the order of the European boat designs, the slope of the cowl being almost flat, and meeting the bonnet line without change in curve. The top edges are rounded over, no upholstering coming over these edges.

Mechanical features include cantilever rear spring suspension, the spring having a 48-inch length and attaching to the frame at front and center and to the axle tubes at their rear ends. Drive is through multiple disk clutch to three-speed gearbox carried on a yoke which goes around the

open flywheel. The propeller shaft is open, has two universals, drive being through springs and torque arm. The axle is floating. Other features include Gray & Davis lighting and cranking, Bosch magneto, centrifugal pump cooling, left drive, center control, 15-gallon cowl gasoline tank and 34 by 4 tires on demountable rims. All fittings of the modern car are included.

The four-cylinder 36 is equipped with a 4 by 5 motor of the L-head, block type, valves being on the left. The gearbox bolts to a form of yoke which passes around the open flywheel similarly to the six-cylinder design in this respect. Other motor details are positive water circulation by centrifugal pump, Bosch magneto ignition and Gray & Davis lighting and cranking, the latter function being accomplished through gear connection to the flywheel.

The chassis is of 116-inch wheelbase and its propeller shaft is open, the drive being through torsion arm. A Paige distinguishing feature is the use of elliptic rear springs which make for great resiliency. The rear axle is three-quarter floating and its housing is of malleable construction. Tires are 34 by 4 on demountable rims, while equipment is complete in all respects.

The cowl gasoline tank fuel system has been a Paige feature for several years, and on the later 36s the filler has been placed on the cowl board.

PARTIN-PALMER

Four-cylinder model at \$495

THE Partin Mfg. Co., Chicago., makes the Partin-Palmer, which is equipped with a graceful streamline body, and is fitted with a four-cylinder, 2.75 by 4 L-head block motor. Left drive and center control are used and the Gray & Davis starting system is listed at \$75 additional to the list price which is \$495. Electric lighting is supplied with the car, the head-light bulbs being of double design.

Ignition is supplied by the Atwater Kent distributor. The remaining features of the car are all of standard construction. The drive is taken from the motor by leather-faced cone clutch through a three-speed gearbox and a floating rear axle. Liberal use has been made of nickel steel in the construction of gearbox, differential and axle shafts, and the gears are of chrome nickel. The body work is an up-to-date streamline construction, and in the roadster incorporates a unique rear deck which serves as a tire support.

PEERLESS

All-purpose models new ones

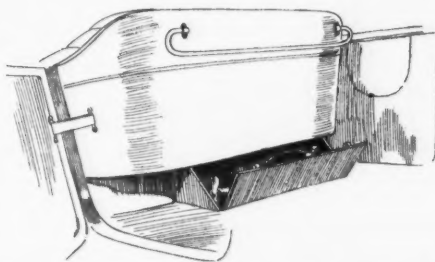
TWO new Peerless cars, known as the all-purpose models, have come out as running mates of the continued big 6-48. The new models are very attractively designed, and are a four and a six, the former selling at \$2,000 and the latter at \$2,250. They are designated as models 54 and 55, respectively. Their bodies are in line with

body fashions of today, presenting a well-worked-out streamline form with characteristic Peerless radiators and bonnets. These slope to the bodies which carry the lines back without break.

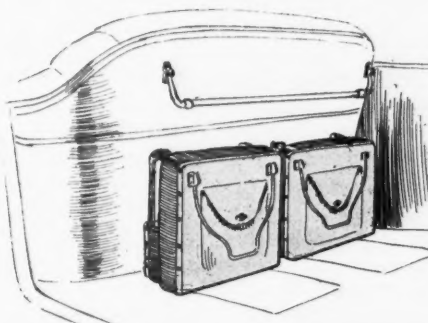
One body feature which is new is the dividing of the front seats into individual arm chair types, a passage running between them giving access to the tonneau. The motors conform to the same general design throughout. They are of the L-head, unit power-plant construction, carried in the frames at three points. In both cases the cylinders are in block form, and dimensions are nearly the same. The six is 3½ by 5 and the four is 3¼ by 5. Ratings are 29.4 and 22.5 horsepower, respectively, by the S. A. E. formula, but the engines are said to attain their highest efficiency at 2,000 r.p.m. when the developed power is 38 and 50.

Stromberg carbureters are fitted, while ignition is attained by Atwater Kent Unisarker system. The motors also carry Kellogg single-cylinder tire pumps, driven from the generator shaft, as well as Stewart vacuum fuel feed tanks to bring the gasoline from rear tanks. Gray & Davis cranking and lighting are also used, there being separate cranking motor and generator, the latter being driven by a shaft from the front gears, while the former drives the engine through gear connection to the flywheel. An 80-ampere-hour Willard storage battery is a part of the system.

Throughout the drive of these new Peerless models, modern features are in evidence, such as open drive shaft of two-universal type which is of tubular form in the center. Its power comes through a multiple-disk clutch, and it delivers it to a semi-floating rear unit, the main housing of which is reinforced pressed steel.



Tool compartment in the back of the front seat of the 1915 Oakland



The extra seats in the seven-passenger Oakland fold up out of the way against the back of the front seat

Platform rear spring suspension which has always characterized Peerless cars is in evidence on the new pair. Tires of both cars are 34 by 4, while the six wheelbase is 121 and the four 113 inches.

The big six, model 48, carries a 4½ by 6, T-head engine with cylinders in pairs; has Bosch ignition, Peerless carbureter, Gray & Davis cranking and lighting, and splash lubrication.

Its wheelbase is 137 inches, drive shaft fitted with two universals, and rear axle floating. The rear spring suspension is of the platform type. Tires are 37 by 5, and options of right drive and control, or left drive with center control are allowed. Prices remain \$5,000 for touring car, and \$4,900 for roadster with all equipment.

PATERSON

Six added; prices lowered

FOR the first year in its career, the W. A. Paterson Co., Flint, Mich., has brought out a six-cylinder car at \$1,495, this being an addition to the line, which last season was made up of roadster and touring types fitted to a single four-cylinder chassis. The roadster has been dropped entirely, and the touring four has been reduced from \$1,197 to \$1,095 with its complete equipment, and having several improvements.

These are principally the redesigning of the motor for greater power though cylinder dimensions are unchanged; the substitution of a floating rear axle for the former semi-floating construction and the adoption of a streamline type of body of attractive appearance.

Both 1915 models are offered only in the one touring car body type, and this is much the same in line for four and six, the latter being somewhat larger. Bonnets have been given a slight slope, and they meet the gracefully-sloped cowls without break. The running boards are clear, and in the front left door there has been placed a compactly arranged tool compartment, with a special place for each tool.

The new cars are much the same in mechanical design as well as bodies. They are fitted with 3½ by 5 Northway unit power plants which are L-heads and block cast. The cylinder heads are detachable, while the upper half of the crankcase is cast integrally with the cylinder block. They have combination Delco electrical units for lighting, cranking and ignition, are fitted with cone clutches, left drive, center control, floating rear axles and drive through torsion tubes which surround the propeller shafts.

The six has 124-inch wheelbase, while the four is 112 inches. Tires on the former are 34 by 4 and on the latter, 33 by 4.

The latest of design features are incorporated in the engines so that they may obtain the greater power development. Valve diameter is increased from 1⅞ to 1⅝ inches, while better reciprocating parts balance and lighter weight make possible the greater operative speed, which goes as

high as 2,500 r.p.m. The pistons have been crowned to give them greater strength with lightness, and multiple thin steel piston rings, three to each ring slot, have also been added as a factor for reducing to a minimum gas leakage past the pistons.

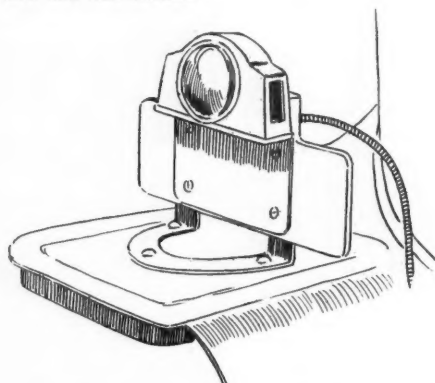
The Stewart vacuum fuel feed system is fitted to the six only. The vacuum tank is placed on the end of the exhaust manifold so as to give good gravity feed almost straight downward to the carbureter.

PILOT

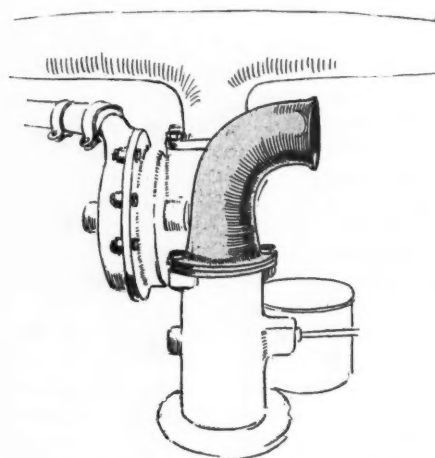
New six added to the line

THREE sixes are made by the Pilot Motor Car Co. One of these, the 55 is an entirely new addition to the line and takes the place of the four manufactured for the 1914 season. The other two, known as the 75 and 60 are continuations.

The new six is the Pilot leader for this season. It is built on a chassis of 126-inches wheelbase and is provided with two or five-passenger body and at an additional price a seven-passenger. It has a 3.5 by 5.25 T-head power plant and is fitted with the popular cantilever springs. The 75 has a 4.5 by 6 and the 60 a 4 by 6 T-head motor. The wheelbases of these two are 132 inches.



Combination taillight and license plate illuminator on the 1915 Packards. The lamp is shown mounted on the end of one of the rear fenders



The auxiliary air inlet on the Packard carburetor has an odd-shaped neck over it. The end of this neck faces rearward so that no dirt will be drawn into the carburetor with the air

Chrome nickel steel piston pins secured in the upper ends of the connecting rods, are used. The bosses in the pistons provide the bearing surface and the makers claim that by so doing they have gained a higher percentage of bearing surface as compared with the practice of fixing the pins in the piston boss. Drop-forged carbon-steel connecting rods and crankshafts are used and the bolts holding the connecting rod caps in place are nickel steel. The aluminum crankcase carries the main bearings on bridges, allowing bearings adjustment to be made by dropping the bottom plan of the motor.

A patented lubrication system is used on all Teetor motors, the Pilot being fitted power plants of this make. There are two overflow oil basins into which the connecting rods dip, these being fastened in the lower half of the crankcase. In the bottom of these two oil troughs there are drilled holes which are just of sufficient size to admit a definite quantity of lubricant. As the oil is circulated by the connecting rods it is replaced by the oil supplied through these holes, giving a system which is claimed to feed in a direct ratio with the motor speed. The reservoir is in the bottom of the crankcase.

The clutch and gearbox are Warner products. The clutch is a cone and the gearbox provides three speeds. They are contained in a unit housing, forming a unit power plant. The drive shaft has two universals and the axle is a floating design.

PACKARD

Line consists of models 3-38 and 4-48

TWO sixes, the 3-38 and the 5-48, are the Packard models which last summer superseded the 2-38 and the 4-48. Both mechanically and in appearance, these cars show little difference over the ones which they succeeded, and they both conform to the well-known Packard lines. Features such as the Packard form of radiator and sloping hood, and the distinctive types of bodies are adhered to.

The general chassis construction is still characteristically Packard, the design being on the two-unit principle. The main unit is the motor and clutch, and the other the rear axle assembly, comprising gearset, final drive and differential gears.

Motors are practically identical with those used in last season's cars. They are L-head with cylinders in blocks of three. The 3-38 is 4 by 5½, giving an S. A. E. rating of 38 horsepower, while the 5-48 with the same stroke has a 4½-inch bore, and is rated at 10 horsepower more by the same formula.

Though of the same operative design, the carburetor body has been changed to give a housing for the auxiliary air valve, while the opening in the housing is turned to the rear to reduce the possibility of dirt getting into the carburetor.

A minor change which is distinctive is the use of headlamps of double design.

Below the main headlight and integral with it is a smaller auxiliary headlight. This is useful for city driving or for meeting cars on the road, and is also advantageous for lighting the road close to the car, since it is lower to the ground than the searchlights, which are better for distance. A refinement to be appreciated is the tool compartment in the left front door, which has a place for each tool. A leather flap goes over the kit.

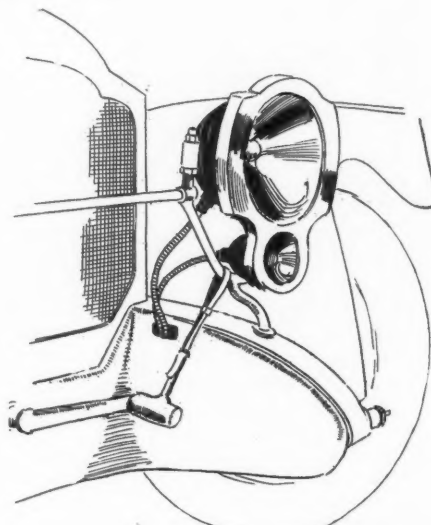
Going into details of the 3-38, minor changes are the increasing the radiator capacity, enlarging the gearset proportions though the design is unchanged, and the increasing of the valve diameter from 2 to 2½ inches.

In the 3-38 motor the double exhaust system is retained, wherein each three cylinders gets rid of its burned gases through a separate passage, though the two passages are integral.

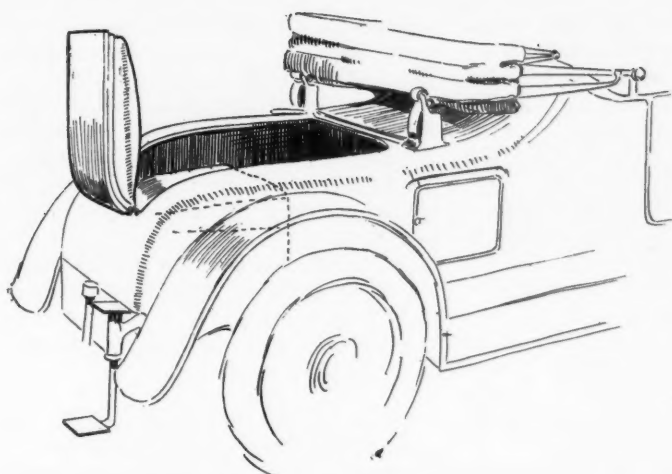
The Packard-Bijur system of cranking and lighting still is employed. It is of two-unit type, both being located on the right. The cranking motor gears 19½ to 1 to the flywheel, while the generator, driven by shaft at 1½ times engine speed, charges at 10 miles per hour, reaching its maximum at 15.

The drive is through a dry plate clutch, then an open propeller shaft fitted with two universals back to the gearbox which gives three forward speeds progressively. The rear axle has the new type of spiral bevel gears, which give a rolling contact that practically eliminates noise. Rear three-quarter elliptic springs are underslung from the axle. Equipment is complete and includes 36 by 4½ front and 37 by 5 rear tires.

The 4-48 incorporates practically the same design throughout as the 3-38 with the advantage of greater power. Tires are 37 by 5 all around; cooling water capacity is slightly greater and front springs a trifle longer.



Packard headlights have the dashlights incorporated, the smaller lamp being used for city driving and the larger one for country work



Extra seat on the deck of the Pathfinder roadster. When not needed, this seat may be folded back into the compartment and the deck presents a clean appearance

Bodies are interchangeable on the two chassis, and they may be had in a number of closed and open types, prices being consistent with the type of body. The 3-38 with touring body for seven sells for \$3,850; with phaeton or runabout body for \$3,750; with limousine and landaulet types for \$4,900, and so on. On the 5-48 chassis, it costs \$4,850 for seven-passenger touring body; \$4,750 for phaeton or runabout; \$5,900 for limousine and landaulet.

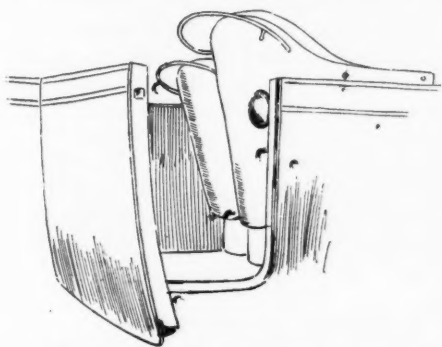
PREMIER

Weidely overhead-valve motor retained

THE Weidely overhead-valve motor still remains the feature of the line of the Premier Motor Mfg. Co., Indianapolis, Ind., and as selling mate to this six-cylinder car is the 6-49 with a T-head engine. The only change made in either of these cars over the 1914 editions, has been in substituting long semi-elliptic rear springs for the three-quarter elliptic used previously.

In the Weidely motor the valves are set directly in the cylinder head, getting away from valve cage construction. No rocker arms are used but instead a single camshaft is mounted above the valves and the shaft operated by worm gearing. The worm gear is attached to the center of the camshaft and another gear in mesh with it is fastened to a vertical shaft which is driven directly from the crankshaft.

The valve stems are not touched directly by the cams, but what are called fingers are placed between the two. These fingers



The tonneau lamp on Pierce-Arrow cars is inserted in the back of the front seat, near the door

merely are levers pivoted at one end and move up and down with the movement of the valves.

This motor 3½ by 5½ is block cast and the valves are of 1½ inch diameter. The thing called splash-pressure uses a gear pump driven from the vertical shaft which operates the camshaft distributes oil by a rotating sleeve attached to the top of the pump. Trough under the connecting rods are fed by lubricant forced through a passage in the bottom plate. Six-sevenths of the oil is fed to the bearings and cylinders and the remaining one-seventh to the valve mechanism. The camshaft is drilled lengthwise and at the cams and bearings diametrically. The oil squirts from the back of each cam and flows over the valve mechanism, then drains through the center of the cylinder head to the crankcase.

The wheelbase of the Premier-Weidely is 132 inches, the clutch a disk, and the gear-set a three-speed selective driving an open shaft to a floating axle. Remy cranking and lighting is used but ignition is by an Eisemann instrument. Three body styles are offered, a roadster and five-passenger at \$2,700, and a seven-passenger at \$2,750.

The 6-49 Premier has a T-head, 4 by 5½ motor which develops unusual power, the figures being 70 horsepower maximum, it is claimed. Triplet casting of the cylinders is used and the blocks are set close to one another so as to decrease the crankshaft length and hence the distance between bearings for the sake of rigidity. In the top of the castings there is the camshaft chamber which is completely covered by an aluminum plate which seals the upper ends of the water jackets.

PIERCE-ARROW

Drop in frame main change

ONLY one change of any importance has been made in the primary design of Pierce-Arrow cars. This has been a drop in the central portion of the frame. With this single change the entire appearance of the new line has been altered and in connection with its adoption it has been necessary to make one or two other minor alterations. The first of the latter is the abandonment of the gravity gasoline feed and the substitution of a pressure system

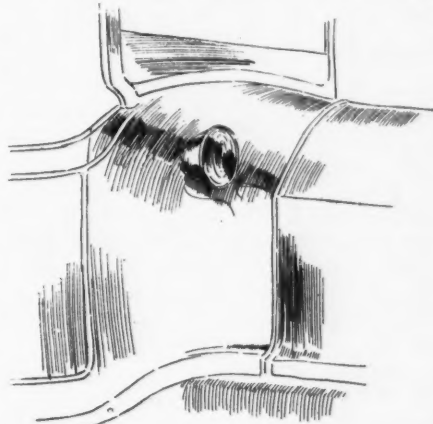
with the tank at the rear of the chassis. In turn the adoption of pressure has rendered possible the raising of the carburetor with a consequent shorter intake manifold.

With but one exception no change has been made in the prices. The largest limousine on the 66 chassis which is the largest of the three sixes which compose the Pierce line, has been reduced from \$7,100 to \$7,000. On account of the drop of the frame which has been made on all three models it has been found possible to lower the bodies and running board without reducing the road clearance.

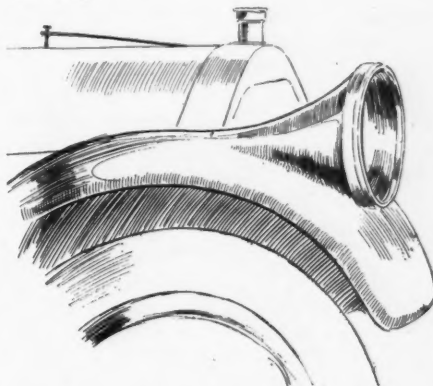
There are also a number of other minor changes for the convenience of the driver. The control members including the accelerator, throttle and spark control have been simplified. The engine cannot be started if the bonnet is locked and the key removed from the ignition switch.

Fifty-four body types and an unlimited number of color schemes is the Pierce offering in the way of carriage work. In addition to the different body designs and the general improvement in appearance because of the drop frame the Pierce company states that the new models have more power, better pick-up and higher speed because of the pressure feed gasoline system. The new fenders are wider, a one-man top has been fitted and individual front seats are provided on the regulation touring cars.

All three Pierce-Arrows are built along



Dash lamps are used by the Pierce-Arrow, and these are made integral with the body



The headlights of the Pierce-Arrow this season, while still on the fenders, have been given a better appearance by the more gradual curve from lamp to fender

similar lines. The chassis are known as 66 A-3, 48 B-3 and 38 C-3. The power plants are 5 by 7, 4.5 by 5.5 and 4 by 5.5 inches. All have their cylinders cast in pairs and the T-head design has been maintained to provide for the large valve area with the shortest possible over-head length. Seven-bearing crankshafts are used and on the camshafts, the cams are pinned to the shafts. The electrical equipment is provided by Westinghouse.

PRATT-ELKHART

A four and a six are new

TWO entirely new chassis are being marketed by the Elkhart Carriage and Mfg. Co. These are a four, model 40, selling at \$1,950, and a six, model 50, listing at \$2,150. In point of design these chassis are practically the same and differ only in the number of cylinders and in various dimensions. Each carries four body styles, two-passenger roadster and four, five and seven-passenger touring cars.

In the new Pratts will be found a Continental motor, Brown-Lipe gearset, Timken axles and Spicer shafts and joints. The model 40 motor is 4½ by 5¼ and the wheelbase 122, while in the 50 the engine dimensions are 3¾ by 5¼ and the wheelbase 132 inches.

Body lines and equipment are the same for both vehicles. In the latter will be found Gray & Davis cranking and lighting, Atwater Kent ignition, Kellogg tire pump, bumper, extra rim, etc.

PULLMAN

Junior, a small four, appears

TWO models, a six and a four, will compose the Pullman line for this season. The six is the 6-48 in practically the same form as was introduced at the 1914 New York show. The four is an entirely new model and will be known as the Junior.

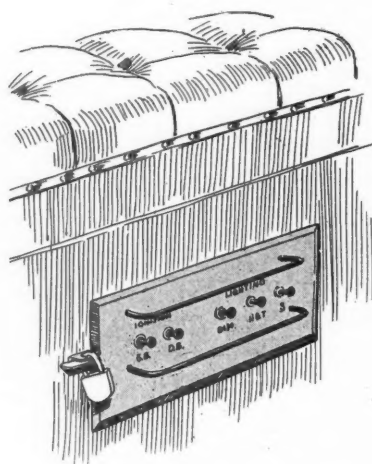
Some refinements have taken place on the six, the main one being the increase in wheelbase of 4 inches, bringing it to 134. This, of course, has necessitated a larger body and a strengthening of the spring suspension, although in general the car is of lighter structure than for last season. The larger body has been utilized to provide 2 inches more in the driver's compartment and 6 inches more in the tonneau. The seats have been widened and deepened and the rear doors carried back further. The dash is now covered with leather and the instrument for the 12-volt electric system mounted on the cowl board. The radiator is lighter, but has a larger cooling capacity and the price remains the same, with Vulcan electric gear shifting at \$150 extra.

The new Junior model has been made to meet the demands for a small four-cylinder vehicle selling at a low price. The price in either touring or roadster design being \$740. The motor is an L-head block with 3.75 by 4.25 cylinder, with the valves on the left side. The crankshaft is carried on three plain bearings

and the camshaft driven by silent chain. The motor clutch and gearbox are included in a unit housing and suspended at three points. Cooling is by thermo-syphon.

The gearbox provides three speeds with a ratio of 4 to 1 on direct. The steering wheel is on the left side and the control in the center. The rear spring is a cantilever, the wheelbase 110 inches, and tires, 33 by 3.5.

The power plant of the six has its cylinders cast in threes. It is an L-head 3.75 by 5.25 design, of which the makers claim 38-horsepower at approximately 1,500 r.p.m. on the block. The clutch is a multiple disk and is a part of the unit power



Ignition and lighting switches on the Studebaker are under the driver's seat and operated by small buttons

plant. Lighting and starting is taken care of by the Westinghouse system and the dash equipment is carried on a cowl board. The 20-gallon gasoline tank is mounted in the cowl.

PATHFINDER

Body refinements mark new models

BODY refinements are many but mechanical changes few in the two Pathfinder sixes, the Leather Stocking and Daniel Boone, offered by the Motor Car Mfg. Co., Indianapolis, Ind.

Especially in the roadster models have body lines been given attention where the streamline idea has been carried out well, and in the facilities offered for carrying baggage. Departure from Pathfinder body design is found in the folding seats under the rear deck and the small door through which baggage can be put into the rear compartment. The new pointed radiator makes the car appear somewhat longer and adds that racy touch desired by so many buyers of this type of vehicle. No dash lamps are used either on this or the touring car. The latter has a longer cowl, a more graceful slope to the new radiator and well curved fenders. A Westinghouse cranker supplants that used last season.

The Daniel Boone, the smaller of the two sixes, sells for \$2,222 in five-passenger form and has a Continental 3¾ by 5¼ motor, equipped with a Schebler car-

bureter fed by gravity. Intake and exhaust manifolds are carried on the right side and are held in place by means of studs and so arranged so as to not interfere with the adjustment of the valves. An eleven-plate dry-disk clutch is the second unit of the power plant and a four-speed gearset, the third. Spiral bevel gears drive the rear axle.

The general design of the Leather Stocking is the same but a larger Continental motor is used, 4½ by 5¼. The wheelbase is 135 inches and the price \$2,750 for the five-passenger.

PETER PAN

Randall company offers new car

PETER PAN is the name given to the new car put out by the Randall company. It is made in four-passenger touring and two-passenger runabout bodies on the same chassis. The wheelbase is 110 inches and although this length is as great as in some of the larger cars, everything about this new product has been made along light lines.

The four-cylinder power plant has its 2.75 by 4.5 cylinders cast in a single block with the valves in the head. Cooling is thermo-syphon through a tubular radiator. A Berling magneto is the sole source of current for ignition and for starting a mechanical device is relied upon.

A multiple-disk clutch transmits the drive through a three-speed selective sliding gearset. Control is in the center and the steering wheel on the left. The springs are floating cantilevers and the brakes, as regards the service set mounted on the propeller shaft with the emergency brakes on the rear wheel.

R. C. H.

No alterations for new season

THE R. C. H. Corp., Detroit, has made no alteration in appearance or design of its touring car. Selling at \$900 with complete equipment, the car with streamline body has had one slight change, that being the moving of the front seat 1 inch farther back so as to make it more comfortable for the front-seat passengers. In the equipment end, one-man top supersedes the double-support type at first used.

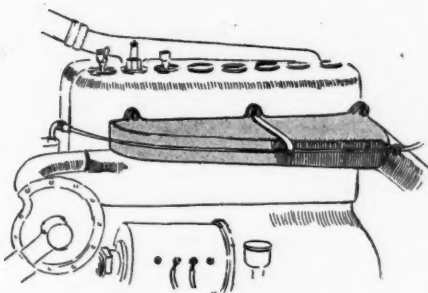
The R. C. H. has a 3¼ by 5 block-cast engine of L-head type. A cone clutch is used which is provided with a brake that applies automatically when the pedal is pressed, thus stopping it from spinning.

The gearset is of the three-speed type, and delivers its power to a rear axle having a reduction of 4¼ to 1. The wheelbase is 110 inches and this allows room for a comfortable five-passenger body of pleasing appearance.

REGAL

Underslung type discontinued

REGAL has discontinued its underslung type and the 1914 overhung model as well, and is making only one four-cylinder chassis, this having little in common with



Tapering exhaust manifold on the Studebaker four

previous Regals. The selling price is \$1,085, which is considerable reduction as compared with the price of \$1,350 on last year's overhung type and \$1,125 on the underslung.

Thus the new chassis marks the passage of the underslung construction from the Regal shops, the same low center of gravity now being obtained on all cars by the use of springs hung from the under side of the axle.

The new Regals are fitted to a 112-inch wheelbase chassis and bodies are of the sloping hood and cowl type, fenders being domed and running board clear.

The motor, with dimensions of 3¾ by 5 inches, is a block type of L-head with cylinder head detachable and exhaust manifold cast integral with the main casting. This engine is 150 pounds lighter than that of last year's underslung car. Better balanced and lighter reciprocating parts are one factor, while the use of a steel stamped lower crankcase portion in place of a cast-iron type is another. The use of multiple thin steel piston rings is another new feature of Regal design.

Atwater Kent ignition of automatic-advance type makes a spark lever unnecessary, while control of the carburetor throttle is mainly by the accelerator. However, a hand lever control is placed on the steering wheel so that the engine may be set at any desired minimum speed.

An innovation is the placing of the radiator filler cap under the hood, it now being a part of the outlet connection from the waterjacket. This prevents soiling the hood and radiator finish by spilling water on it in filling.

A Rushmore two-unit system of cranking and lighting is employed, the cranking motor gearing to the flywheel, while the generator is carried on the right forward side of the engine and has a unique belt drive. A pulley on the end of the crankshaft runs over both the fan pulley and generator pulley.

A three-quarter floating axle replaces a heavier half-floating type used.

REMINGTON

A NEW four-cylinder car known as the Remington makes its appearance this season in roadster and touring forms. The chassis upon which both cars are mounted is the same, with the exception that 30

by 3.5 tires and demountable rims are used on the touring, while the roadster has 30 by 3 tires with clincher rims.

The motor is a four-cylinder block-cast, 3.25 by 5 unit power plant, with three-point suspension. All the valves are on the right side and are inclosed by a detachable cover plate. The valve diameter is 1.5 inches in the clear, with a .31-inch lift. The piston length is 4.5 inches connecting-rods, 10.5 inches, with a .875-inch piston ring of 1.75 inches length. The crankshaft is carried on two main bearings and has a diameter of 1.75 in. The camshaft also is carried on two bearings and has a 1.25-inch diameter.

Lubrication is accomplished by splash, ignition by the Atwater Kent distributor system and starting and lighting by Ward-Leonard installation. The clutch is a cone and the gearbox provides three-speeds operated by a mechanical, automatic gear-shifter. The spark control is also automatic, having the centrifugal arrangement in the distributor.

The rear axle is a three-quarter floating type with bevel-gear differential, made of nickel steel. The bearings in the rear axle are Hyatt high-duty type, while in the front wheels the Bower rollers are used. The front axle is an I-beam drop-forged. The wheelbase for both cars is 106 inches.

Both the touring and roadster bodies are fully equipped. The dash is of Circasian walnut, with all the instruments mounted upon it. A long cowl is used and advantage is taken of its length to house the gasoline tank, which has a capacity of 12 gallons. In the touring body a robe rail formed by an adjustable strap is used.

REPUBLIC

Only one model; no changes

THE Republic line of one model is continued without change as far as the makeup of the output is concerned. Several detail changes are worthy of note, particularly in the employment of the new vacuum feed system for gasoline and in the adoption of the Rayfield carburetor as standard equipment.

The power plant remains the same in every respect, the six T-head cylinders being cast in pairs. The dimensions of the cylinders are 4.25 by 5. The water is circulated by a pump. Oiling is by a pressure system in which a gear pump takes the oil from the crankcase and forces it under pressure to the main bearing. From these points it is carried through the drilled crankshaft to the lower connecting rod bearings.

The entire electrical equipment is furnished by Delco. This is a dual system and not only takes care of ignition but also of lighting and cranking. The wiring is double and the voltage of the system, 7.

The clutch is a leather cone in the flywheel and the gearset is a four-speed selective located amidships. Final drive

is by shaft to a bevel gear, floating rear axle, which delivers the propulsive thrusts through radius rods. The wheelbase remains the same as last year at 133 inches.

REO

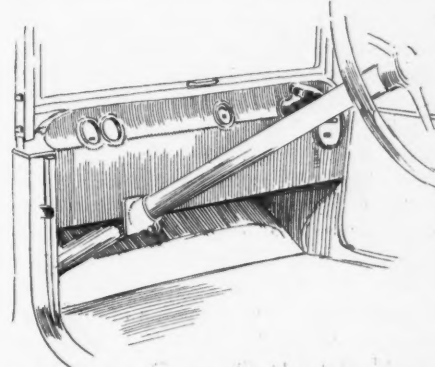
Six-cylinder model a newcomer

THIS year the Reo Motor Car Co., Lansing, Mich., discontinues its one-model policy, and adds a six-cylinder model selling at \$1,385 to its improved edition of the four-cylinder car which it has been making for several years under the name of Reo the Fifth. The new Reo adheres, in a general way, to characteristic practice of this company, this being true more especially in the motor. Streamline bodies grace both chassis.

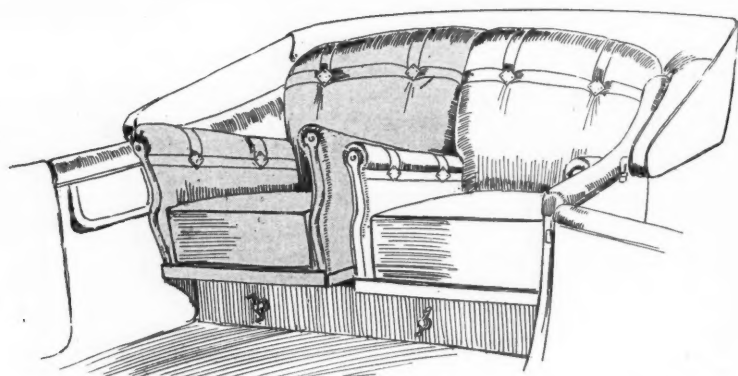
Some of the special constructional features of this new six, which has 122-inch wheelbase, are the spiral-bevel gears used in the floating rear axle and the cantilever rear springs which are attached to the frame and axle housing in the regular way. In addition to body improvements in the Reo the Fifth which make for better upholstery and more roominess, there are such important alterations as the increase of the wheelbase from 112 to 115 inches, the use of a new cylinder design with independent exhaust ports, the addition of friction surface to the disk clutch, the non-rattling support of the brake mechanism and the improved starting mechanism doing away with shifting of gears.

The motors of both Reos adhere to the distinctive construction characteristic of these engines wherein the inlet valves are placed in the head and the exhausts on the side. The six is a 3½ by 5½ engine with 40 to 45 horsepower rating and cylinders in threes. The four has 30 to 35 horsepower with 4½ by 4½ inch cylinders in pairs. Crankcases are of the barrel form of aluminum, and helical timing gears are employed as well as exhaust manifolds of the ejector type which reduce the back pressure. Crankshafts and camshafts are supported on three bearings.

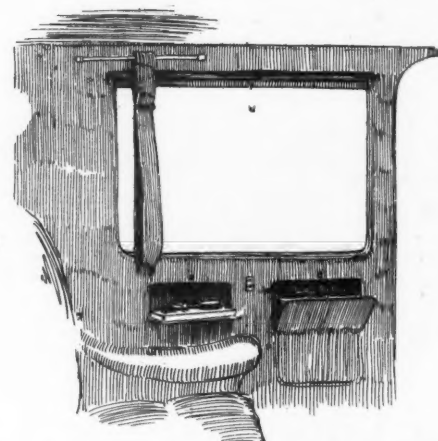
Ignition, cranking and lighting for the two models is uniform, the ignition distributor being combined with the generator with the storage battery as its source of current. The starting motor connects in



Clean dash on the Studebakers obtained by shifting the ignition and lighting switches to a place under the driver's seat as shown on the previous page



Reclining individual seats on the 1915 Stevens-Duryeas. The left illustration shows the seat reclined its limit. The seat on the right is in normal position. Operation is by the small handle underneath each seat



Neat arrangement in Stevens-Duryea limousine. The small box at the left holds the telephone which is used for communicating with the driver. A toilet set is in the right compartment

the gearset to the mainshaft through worm gear construction.

The clutch used is a dry-disk type which is changed from that formerly used by giving it more friction surface, and by a new operating mechanism which requires less foot pressure. Streamline hub caps, so called, are fitted on the new Reos. These are simply smooth, domed housings for the spindle nuts which are held in place by a set screw.

The drive construction of the six terminates in a floating rear axle, while that of the four is semi-floating. The brake rods and parts are fitted with anti-rattlers which aid in silencing the cars. Gearsets are of the three-speed, selective design and gasoline tanks are carried under the front seat, feeding by gravity.

In addition to standard equipment, the six carries a motor-driven tire pump driven from the clutch shaft with the hose permanently connected to the pump and placed in a special compartment in the body.

STUDEBAKER

Larger bodies and lower prices

BOTH the four and six Studebakers of the 1914 season have been continued for this year. While they are the same in all the main features as the previous cars, there have been many alterations in the way of refinement throughout the chassis, bodies and equipment. The result is that the cars are larger than before although selling at \$985 for the four or \$65 less than in 1914 and \$1,385 for the five-passenger six or \$190 less than in 1914. The seven-passenger six is listed at \$1,450.

In both motors, an increase of 15 percent has been made possible in the maximum power by reducing the weights of the reciprocating parts and altering the manifold design. Four ounces have been cut from the piston assembly and although the valve sizes remain the same, greater efficiency has been obtained by increasing the port sizes. The lubrication system has been maintained, but the scoop has been changed in shape and the splash troughs altered to give greater oil economy.

While the Schlebler model-R carbureter is used this year, a means of preheating

the intake air from the exhaust is also included. In the four, the carbureter is now bolted against the integral cylinder casting without any exterior intake manifold.

The same clutch has been retained, but the leverage on the operating members on the six has been altered to give an easier throw.

By improvements in the body work and equipment 100 pounds has been cut from the weight of these models. This has been effected by substituting pressed steel for wood and by the use of a new top. The instrument board is now a stamping and is free from the instruments. Dash lamps are discontinued.

SINGER

Sold from factory to consumer

THE Singer Motor Co. which recently has been formed has brought out a six-cylinder car fitted with a 4 by 5.5 unit power plant suspended at three points, dry-plate clutch and four-speed gearset with direct on fourth. The wheelbase is 135 inches and the tires are 36 by 4.5. A feature of note is the unusual method of marketing the car which will be directly from the factory to the consumer.

The large power plant which is a T-head design is stated to show 100 horsepower at 2,000 r. p. m. on the dynamometer, and advantage has been taken of this high power by gearing the direct drive 3.66 to 1. In the actual construction of the motor the cross-head pistons are the only departure from standard practice as far as the internal structure is concerned. On the exterior of the motor the novel design of the intake manifold will be immediately noted. Both the carbureter and the manifold are waterjacketed but the latter is especially notable for the large radius of its turns and the diameter of the pipe, which takes a 1.75-inch C. R. G. carbureter.

The exhaust manifold is designed with interior walls to avoid in any way difficulties which might be experienced by two cylinders exhausting at the same time.

The method of fastening the steering drop arm is a departure from standard practice, the hub being pierced with tri-

angular slots corresponding to a similar opening in the shaft to which it fits. The shaft is then tapered so that adjustments for wear may be made by tightening the nut holding the arm in place. This is a patent of the Jacox company. The gear itself is a worm and nut having a 2-inch column and a 19-inch wheel.

A distinctive type of streamline body having unbroken lines from the pointed radiator to the moulded surface at the rear of the tonneau is fitted to the chassis. Left drive with center control is used and the one-piece design is carried out in the fittings such as the windshield which is built directly into the cowl. The instruments are carried on a cowl board and a fire extinguisher is an unusual addition to the equipment.

STEVENS-DURYEA

Bore increased; electric starter added

STEVENS-DURYEA cars have motors of larger bore by $\frac{1}{8}$ -inch this season. Besides this change the drive has been shifted from right to left and an electric lighting and starting system has been added as regular equipment. Although the same model number is employed to designate both the roadster and touring cars, the chassis are really different as the wheelbase for the roadster is 131 inches and for the touring car is 138 inches. This is the same as for 1914.

The feature of the new line is the roadster which now has a 4.325 by 5.5 power plant. Besides the novel adaptation of the streamline effect a gracefully sloping deck has been provided which incloses a compartment for carrying two spare tires mounted on their rims, or one wire wheel mounted and an extra tire. When the top is down it disappears completely from view inside the body. The top is supported by mechanical means by neat rigid joints which cause it always to follow a certain path when folding into and being withdrawn from the body. It is self-supporting and when up requires no braces, being

rigidly fastened to the windshield support. When the top is folded, the concealing compartment is completely covered by the upholstery and when up the opening is also covered except for the change in bore, the power plant for the touring cars remains the same. It is $4\frac{1}{8}$ by 5.5 suspended at three points. Like other Stevens cars this has a disk clutch, progressive three-speed gearset, floating axle and 37 by 4.5 tires.

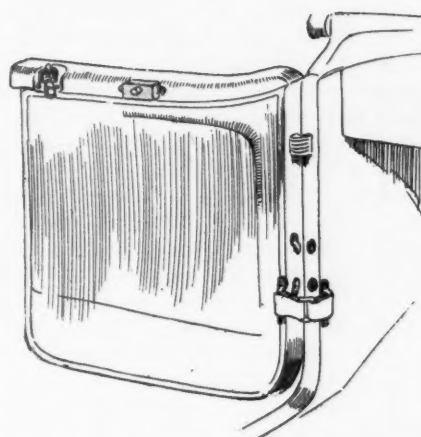
A new type of auxiliary seat is employed in the seven-passenger touring cars. Each seat has one upholstered arm on the inner side while the upholstered arm rail provides the rest on the outer side. The construction allows for folding backwards and sidewise against the side of the tonneau, or it can be tipped forward in front of the entrance allowing plenty of room in the tonneau and concealing the extra seats from view. An addition to the line is made in the form of a seven-passenger landaulet on a 139-inch wheelbase chassis.

The D-six with motor $4\frac{3}{8}$ by $5\frac{1}{2}$ is listed at \$4,550 for the roadster and touring car, \$5,400 for the landau-phaeton, \$5,750 for the demi-berline and \$5,800 for the limousine. The prices for the D-six with $4\frac{1}{8}$ by $5\frac{1}{2}$ motor are: \$4,650 for the runabout, roadster, touring car and phaeton; \$5,650 for the limousine; \$5,750 for the landaulet and \$5,950 for the berline.

SAXON

A six-cylinder model at \$785 added

A SIX-CYLINDER, five-passenger touring car selling at \$785 with Gray & Davis electric cranking and lighting equipment is the new car to be announced by the Saxon Motor Car Co. This vehicle strikes the lowest price mark for a six-cylinder car announced in this country. Its features in the main are a 112-inch wheelbase, cantilever springs, both front and rear, and a five-passenger touring body. The motor is a block-casting, $2\frac{7}{8}$ by $4\frac{1}{2}$, driving a disk clutch running dry and power transmission from this unit is by shaft to a three-speed gearset mounted on the rear axle, the same construction in



The electric horn on the Stevens-Duryea cannot be operated unless the door next the driver is closed. The button is shown above and it is wired through the door to two contacts. When the door is closed, these contacts, by means of springs, touch others in the body. The latter also are shown above the lower door strap

matter of design as is used on the four-cylinder Saxon model.

The price of the four is \$395. This small car is made in roadster form and is continued with a larger body, better upholstery and complete running boards. There now is a three-hinged bonnet in place of the one-piece design; the gasoline filler tank now is on the cowl instead of beneath the bonnet; the bonnet locks now have concealed hinges, and throughout the body work better finishing and better upholstery will be noticed. An example of this is the baking on of the radiator enamel to make it more durable.

In the detail mechanical changes the gasoline nozzle on the carburetor is improved, there now is a dash throttle, the brake straps are now provided with two supporting anti-rattle springs, the battery is now carried in a well and the rear axle has been redesigned to prevent leakage of lubricant. Another important change in the rear axle is the fitting of a through pin for locking the differential pinion carrier in place of a set screw. The steering

gear has been improved by the use of better material.

This car is made only in the roadster type. It has a 2.625 by 4-inch block power plant with Atwater Kent ignition, thermo-syphon cooling, a two-speed gearbox on the rear axle and a semi-floating axle.

S. G. V.

Entirely new model brought out

ONE chassis upon which all types of bodies are mounted is made by the S. G. V. company. This is an entirely new model and has a 3.875 by 4.325 motor as compared with the 3.75 by 5 motor introduced last season. The new car has its four L-head cylinders cast in a single block with the valves on the right side. The single integral camshaft is driven by a silent chain and the valves are inclosed, giving a clean exterior appearance. Both the intake and exhaust manifolds are cast separately from the cylinder, the exhaust being ribbed according to the European practice which this car closely follows. The motor is supported at four points.

A centrifugal water pump in connection with a cellular radiator cools the motor and the fan is formed by the spokes of the flywheel. Another point at which European practice has been followed is in the pressure feed lubricating system in which a gear pump forces oil to every bearing, even to the piston pins. Ignition is by a single system, a Bosch insulation with one set of plugs taking care of this function. The carburetor is 1.25-inch Zenith fitted with hot-air pipe and taking its feed by pressure from the 20-gallon gasoline tank located at the rear of the chassis. The Ward-Leonard system is provided for lighting and starting.

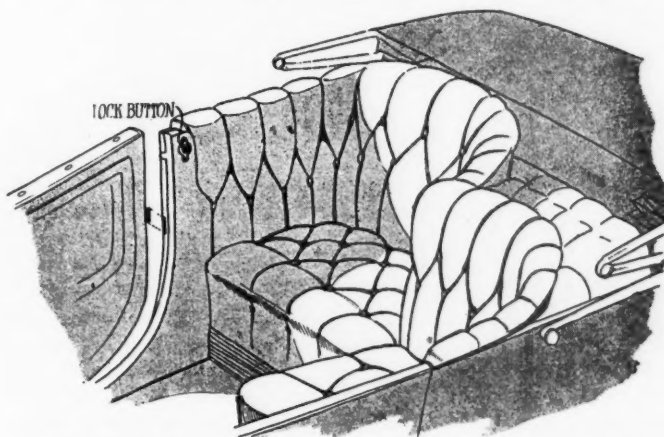
The transmission system is made up of a disk clutch, selective sliding gearset providing four-speeds and a semi-floating rear axle with a bevel-gear differential. The drive is taken through the springs. The wheelbase on the new model is 118 inches, the tires 34 by 4 and the tread standard. The body work is of European style, especially insofar as the closed cars, namely, limousine, brougham, landaulet and landau are concerned.

SIMPLEX

Company makes chassis only

SIMPLEX cars continue to be made in three chassis: a 38 shaft drive, a 50 inclosed chain or shaft drive and a 75 inclosed chain or shaft. The numbers serve to indicate the maker's horsepower rating as well as the model. The Simplex company manufactures only the chassis, the bodies being subject to order.

All three Simplex models have T-head motors supported at four points, dry-disk clutches located in the flywheel and four-speed gearsets mounted amidships and supported at four points. The 38 is a 4.875 by 6.5, with its cylinders cast in pairs, the manifolds are cast separate with the intake on the right and the exhaust



The Scripps-Booth roadster has its seats set staggard. The doors are opened electrically in the same fashion as the doors in many flat houses. A small electromagnet does the work and a button on the side, as shown, is the control. The illustration at the right shows how the cowl lamp is housed under a visor



on the left. The motor is water cooled, a honeycomb radiator being used in connection with a centrifugal pump. Dual ignition is employed, a Bosch high-tension magneto being used as the current source. The balance of the electric equipment is a Bosch-Rushmore outfit of the 6-volt type operating with a single-wire installation. The 28-gallon gasoline tank is operated by a pressure system and a Simplex carburetor is used as the vaporizing medium. A shaft with bevel-gear reduction of 2.75 to 1 on fourth speed is used and the drive is taken through a torsion tube. The wheelbase of this chassis is 137 inches.

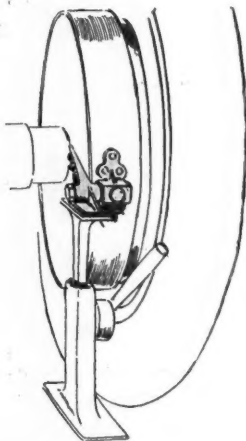
The 50-horsepower model which was new last year has been continued without change. It has a bore of 5.375 and a stroke of 6.5 inches. In general design it is similar to the smaller model described. The only difference is, that if desired, a chain drive will be fitted. When the latter is the case, the propulsion is taken through radius rods, while as with shaft a torsion on tube serves this purpose.

The 75-horsepower model has the same sized cylinders as the 50 and in fact is the same throughout as the latter, except tuned up for racing. The valves are larger. A steeper set of cams is used and a dual-double ignition system with two sets of spark plugs are provided. Chain drive is offered in 124-inch wheelbase and chain or shaft in 137.

SCRIPPS-BOOTH

Appointments feature of the car

LUXURY is the keynote in the latest product of the Scripps-Booth Co., Detroit, brought out to succeed the cyclecar which it made a year ago. The new Scripps-Booth is a standard type of car which has a number of unusual and commendable constructional features and sells for \$775 in roadster form. Fitted to a wheelbase of 110-inches, and mounted on 30 by 3½ tires, the car has been built with the idea of making it the best appointed in its class. The motor is a 2¾ by 4 overhead-valve type.



The 1915 Speedwell has a neat arrangement near the brake drums for accommodating the head of a lifting jack. A small plate just fits the upper portion of the jack and makes the jack hold firmly

Its equipment is of the most modern type, including motor-generator for lighting and cranking, Houk wire wheels with one extra carried on the rear deck, electric door openers, electric horn, 9-inch Turkish upholstery, attractive windshield, silk-mohair top and curtains.

Made with an option of three treads, 40, 56 and 60 inches, the chassis make-up takes in a cone clutch, three-speed gearset in unit with the motor, double rear-wheel brakes, floating rear axle, tubular drive shaft, semi-elliptic front and cantilever rear springs and a frame which narrows to both front and rear in order to follow the curve of the body and thus give rigid support to it.

The S.A.E. rating of the engine, which is a Sterling, is 13.25 horsepower. It is a high-speed type of power plant, running as high as 2,750 r. p. m. without much drop in the power curve. Silent operation has been attained by special cam design which allows the valves to drop within .001 inch of their seats and then slowly lets them down the remaining minute distance. The cylinders and crankcase are cast in one piece, and the head is detachable. It carries the valves and their rockers together with the passages to the intake ports. Two main bearings support the crankshaft, and three carry the camshaft.

Lubrication is of the circulating splash type, ignition is cared for by Atwater Kent distributor and cooling is by thermosyphon. The motor-generator for lighting and starting is hung from an integral bracket on the right side of the crankcase. It connects to the crankshaft through silent chain, the sprocket for which is just ahead of the flywheel.

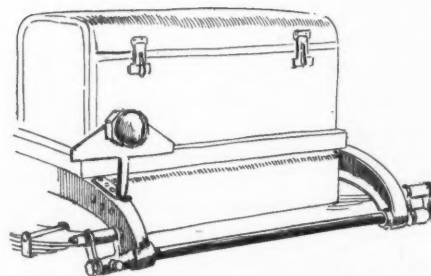
The car has a leather-faced cone clutch from which the power goes to the rear through a three-speed gearset in which unusually large gears with a ⅝-inch face are employed. The tubular propeller shaft is 1¼ inch in diameter, and the drive is taken through the springs, a steel arm taking the torque.

Unusual features are the use of pedals for operating both sets of brakes, the clutch pedal taking care of the service set in addition to performing its clutch function. Steel cables take the place of rods for working both sets of brakes. Push buttons placed close to the doors operate the latches magnetically, which is a point new to motor car body building. Besides the roadster body, a cabriolet and a coupe are fitted to the same chassis.

SPEEDWELL

Six-cylinder chassis with rotary-valve motor

THREE minor changes are to be seen on the Speedwell six, the only car in this country fitted with a rotary-valve motor. The new Speedwell has Westinghouse cranking lighting and ignition instead of that previously used, Stewart vacuum gasoline feed instead of straight pressure and the instruments now are on a cowl board instead of forward on the foot boards.



The rear of the Stutz frame horns are connected by a stout steel bar to give rigidity and act as a support for the spring shackles

The Speedwell is fitted with a Mead-type motor in which there are two horizontal valve rods, one on each side of the cylinder. Each rod contains six slots and these register with slots which communicate with the inlet and exhaust manifolds. In order to assist in the lubrication of these valves they are grooved longitudinally and between each cylinder the valve is fitted with a ring so there will be no leaks from one cylinder to the other. The valves are made of gray iron and the cylinders of semi-steel so that wear will be reduced.

Aside from the valve arrangement and the necessary changes in cylinder design the motor shows no radical construction. Its dimensions are 4⅞ by 5¼ and it drives through a disk clutch and three-speed gearset, in unit with it, to a Timken floating axle.

The Speedwell rotary is made with three body types, a four-passenger at \$2,850, a five-passenger at the same price and a seven at \$2,950. A six-passenger also is made by adding two auxiliary seats to the four.

STEARNS

New four-cylinder Knight-type

THE new four-cylinder Stearns, Knight-type, at \$1,750, is one of the most interesting cars, because this is a price almost \$1,000 under any previous Stearns-Knight, and the low mark for a Knight sleeve-valve motor in this country. Stearns has been one of the several to bring out a small four in preference to a small six. This new model, with 3.75 by 5⅝ block cylinders, incorporates many unusual features, including the crankshaft with counterbalance weights to overcome centrifugal force, a specially light cylinder block, embracing the intake and exhaust manifolds, and a light construction in the crankcase, timing chain cover and other parts, by the use of stamping in such places where strength is not a primary consideration. In addition to the balanced crankshaft, designed to prevent wear on the crankshaft bushings, tubular connecting rods are used, these also being specially balanced at the lower ends by a short extension of the tubular shaft from the connecting rod cap.

Lubrication throughout is by pressure to the main bearings rather than by the trough system earlier in vogue in Knight

motors. With the pressure system there is a flow in proportion to motor speed from 15 to 60 pounds pressure, the latter mark representing the high mark of pressure. The high-speed, high-efficiency motor has a three-part electric system, including an Eisemann magneto, constituting the only ignition system, a Gray & Davis cranking motor and lighting generator.

The chassis possesses not a few improvements, in spite of its price. First comes the use of spiral bevels in the rear axle, and also the use of a pressed-steel axle housing taking the place of the forged type. The service brake is moved from the rear wheels to back of the gearbox; cantilever rear springs are introduced and the gasoline tank is placed in the cowl. Besides being manufactured as a touring car, it is marketed as a cabriolet and also a limousine.

Stearns is listing two other models, one known as the big four, 4.25 by 5.5 cylinders, and the other the six, 4.25 by 5.75. These are continued practically as during last year.

SPAULDING

Improved sleeper the feature

THE single four-cylinder model H Spaulding chassis is continued for 1915 with a number of improvements, chief among which are the placing of the rear springs underneath instead of over the axle, and the fitting of a body with more graceful lines. Aside from these changes, the car is practically the same as before, being fitted with a touring body which can be converted into one with sleeping quarters, sufficient for five persons. This is done in a few minutes' time by dropping the hinged back of the front seat. An electric reading lamp is provided in the compartment so as to make the improvised hotel room comfortable.

The chassis has a 120-inch wheelbase and is fitted with a Buda motor, 4¼ by 5½. Ignition is by Simms magneto and cranking and lighting by the Entz system. The gasoline feed used is a pressure-gravity system in which fuel is forced from a container at the rear to an auxiliary tank on the dash and thence to the carbureter by gravity.

SPHINX

Newcomer in low-priced field

A NEWCOMER for this season is the Sphinx, a four-cylinder car selling at \$695. It has a five-passenger streamline body, mounted on a 112-inch wheelbase, a four-cylinder block power plant, three-speed gearset and a roller-bearing rear axle. It is thoroughly equipped with electric lighting and starting and wire wheels may be had for \$25 extra.

The motor has its 3.375 by 5 L-head cylinders cast in a block with a detachable head. The power plant is featured by lightweight reciprocating parts and throughout is of high-speed design.

In connection with the generator a battery system of ignition is used, the high-

tension distributor being operated from a vertical worm-driven shaft. Lighting and starting is accomplished by a single-unit motor-generator. The system operates at 6 volts and is fitted with an 80-ampere hour storage battery.

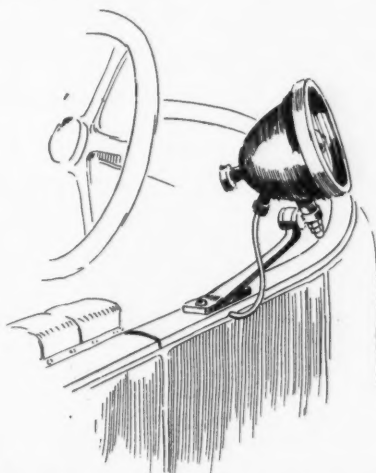
The lubricating system is a circulating splash, the pump being driven from a cam off the camshaft. A 1-inch carbureter fitted with hot-air intake and a shut-off valve for starting, is fed by gravity from a 25-gallon gasoline tank.

A 12.5-degree cone clutch, having a chrome leather facing with spring and plunger inserts for gradual engagement, transmits the power to a three-speed Covent gearset located on the rear axle. The drive shaft, countershaft, and dog clutch of this gearset are carried on roller bearings. The rear axle is a Weston-Mott carried on Hyatt bearings and the front axle is tubular with cup and cone ball bearings in the hubs. Control is central with the steering wheel on the left. The clutch and service brake are both operated from the left pedal. The emergency brake by the right pedal, thereby eliminating all but the gearshifter lever.

STUTZ

Ten cars, six fours, four sixes

TWO new Stutz cars have been added to the previous series. A four-cylinder roadster on a smaller chassis, than any as yet put out by this concern, is an entirely new design and the other is a four-passenger speed type of body on the same chassis as used for the roadster model. In addition to these there are eight other cars which are continuations. This brings the line to ten cars, six fours and four sixes. Of the four-cylinder models the touring and sedan have a wheelbase of 130 inches and sell respectively at \$2,275 and \$3,675; the Bulldog roadster and Bearcat have a



Searchlight mounted on the door of the Stutz. It is easily operated by the driver in inspecting the road ahead

wheelbase of 120 inches and are listed respectively at \$2,250 and \$2,000.

The H. C. S. four which is a new model and lists at \$1,475 has a wheelbase of only

108 inches. Of the four sixes the touring and sedan which have a wheelbase of 130 inches cost respectively \$2,400 and \$3,800, while the roadster and Bearcat which both have a wheelbase of 120 inches are listed at \$2,125 each.

The smaller car is a typical Stutz design except an L-head motor is used whereas former motors have all been T-heads. Another departure is the casting of the cylinders in blocks instead of pairs. The use of block cylinders and the connection of the forward end of the torque tube to the clutch housing instead of to a cross frame member has rendered possible a wheelbase of 108 inches, whereas the larger roadster has 120 inches.

The new four-passenger speedster is styled the Bulldog. It is mounted on a chassis of 120-inch wheelbase, this being the same chassis in every particular as that manufactured for the 1914 season.

The characteristics of Stutz design which are common to all the cars are the leather-faced cone clutch and the Stutz rear system with its three-speed gearset mounted as a unit with the axle.

TOURAINÉ

Touring car and limousine

TWO Touraine cars, one a touring and the other a limousine, both of seven-passenger capacity, are put out on the 134-inch wheelbase. The six-cylinder power plant has its 4 by 5.5 cylinders cast in threes. They are T-head shape. The maker's rating of this motor is 61-horsepower at 2,220 r.p.m. The intake valves are located on the right and the exhaust valves on the left. Both camshafts are driven by helical gears. The lubricating system is a circulating splash operated by a gear pump and the water cooling system has a centrifugal pump, which forces the water through a honey-comb radiator.

For ignition a Bosch dual system is provided. The gasoline system is a pressure feed with the gasoline tank swung on the rear. The capacity of the tank is 23 gallons, and is used in connection with a 1.5-inch Zenith carbureter. Starting and lighting is by the Westinghouse 6-volt system with single wiring. The storage battery is a 150-ampere-hour Exide.

The clutch is a multiple disk carried in the flywheel, having steel against Raybestos friction surfaces. The gearset provides four speeds and the rear axle is a floating design with the propulsion taken through the torsion tubes. Control is in the center with the steering wheel on the left. Full equipment is sold with the car, the tires being 34 by 4.5 with Q. D. demountable rims.

TRUMBULL

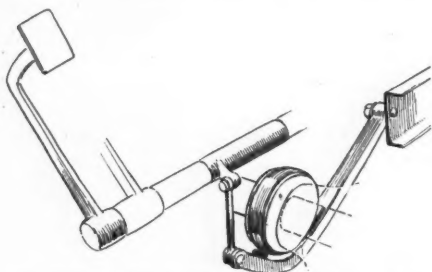
Friction and chain drive eliminated

THE most radical change in the Trumbull car is in the transmission. The friction and chain drive has been eliminated, substituting in its place a selective

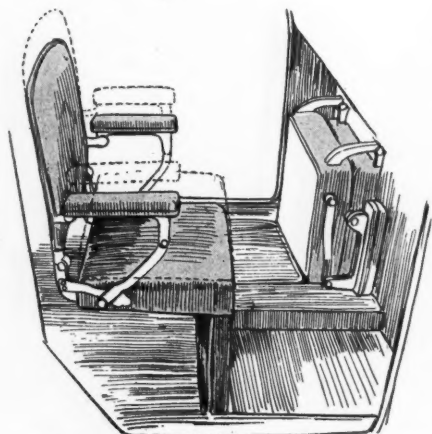
sliding gearset having three speeds. This is in unit with the differential on the semi-floating rear axle. A cone clutch also is used in connection with center control and the car has been equipped with both internal and external brakes operating on the rear hub. The motor has been remodeled to some extent, principally in the shortening of the intake manifold, which has resulted in the raising of the carbureter. A newly-designed camshaft, with cams which have been laid out along the line of quietness, are also innovations.

The Trumbull is a miniature car. It is built along standard lines and has all the up-to-date equipment and luxuries of larger cars, except the size. The wheelbase is 80 inches and the tread 44 inches. It is claimed that a fuel consumption of 35 miles per gallon of gasoline can be obtained with this little car. It is made in two styles for passengers, that is, a roadster and a coupé. Electric lighting and starting is extra, but all the ordinary equipment is standard.

The four-cylinder motor has its 2.875 by 4 cylinders cast in a single block. It is lubricated by a combination pressure and splash system, in which a pump delivers oil to all the main bearings and timing gears and the rest of the motor is lubricated by the splash. The two-passenger body, which is regularly fitted, is of the sociable roadster type, having the seat



Simple clutch brake used on White cars. The brake, which is faced with fabric, bears on a wheel fastened to the clutch shaft. By pressing the pedal the brake automatically stops clutch spinning



Folding tonneau seat of the 1915 Whites. The seats are sunk into the floor so that the extra passengers sit on the same level as those on the rear seats

continuous without subdivision between the driver and passenger.

TWOMBLY

Town car and a roadster

TWO bodies, a town car which serves as a taxicab and a roadster of two-passenger capacity, are mounted by the Twombly company on its 100-inch wheelbase chassis with 44-inch tread. The power plant is a four-cylinder 3.125 by 4 with L-head cylinders cast in a single block. The cylinder heads are removable which is unusual in the L-head type of construction. Both intake and exhaust valves are on the left and are driven from a single camshaft through a helical timing gearset. The intake and exhaust manifolds are cast together and are unjacketed. The motor is supported at three points.

Cooling is effected by a thermo-syphon system, lubrication by circulating splash and ignition by the Splittorf single high-tension system with hand control. The carbureter is optional, being either a Holley or Zephyr 1-inch, fed by gravity from the 8-gallon gasoline tank located in the cowl.

A cone clutch transmits the drive to a three-speed selective gearset located on the rear axle. From this point the transmission consists of a worm beneath the wheel mounted just to the rear of the gearbox and a semi-floating rear axle. The wheels are of wire and are undemountable. The tires are 30 by 3.5 and the rear spring is a compound cantilever. This spring, contrary to general light car practice, does not transmit the drive as this is taken through a torsion tube. Two sets of brakes are fitted, both on the rear wheels. The bodies, though small, as is natural with the short wheelbase and narrow tread, are fitted with up-to-date equipment and deep upholstery.

VELIE

An entirely new six at \$1,595

THE Velie factory at Moline, Ill., will be engaged for the coming year in the production of three chassis, one the Biltwell model, a brand new six, selling at \$1,595, and two improved models, one a four, and one a six. The model 11, last season's small four, has been discontinued. Price reductions have been made in the continued chassis, the four selling at \$1,750, a reduction of \$250, and a six at \$2,015, a reduction of \$325. No changes of importance have been made in the carried-over models, except the adoption of better-appearing bodies.

The new six incorporates a number of noteworthy features, among them being the spiral-bevel rear axle, Hotchkiss drive, Atwater Kent ignition with automatic spark advance, and Stewart vacuum feed. The motor used is a Continental 3½ by 5 and forms a unit power plant with a cone clutch and four-speed gearset. The frame of this car has an unusual taper, the distance between front spring centers being 27¼ inches allowing of a very short turning radius. The wheelbase is 124 inches,

and the equipment includes Gray & Davis cranking and lighting, Taylor Noil tire pump, auxiliary emergency battery for ignition, double headlights, inspection lamp, etc.

The four has a Velie-made motor 4½ by 5¼ and two of the features are the transverse drive of the magneto, and the feed from the carbureter through a pipe passing over the cylinders to the other side of the motor. The running gear consists of a dry disk clutch, four-speed gearset and Timken floating axle. The larger six is Continental equipped, the motor size being 3¾ by 5¼, and in general design is the same as the new six.

VIXEN

Narrow-tread tandem-seater model

A SMALL 36-inch tread vehicle with a 106-inch wheelbase and fitted with a three-passenger, tandem-seating body is being marketed by the Davis Mfg. Co., Milwaukee, under the name of the Vixen. It is fitted with a four-cylinder block motor, 2¾ by 4, using Atwater Kent ignition and thermo-syphon cooling. The drive incorporates a friction set located under the rear seat, there being one friction driving wheel for each rear wheel. The disks are fiber against iron and the final propulsion is by side chains to the wheels. The latter are wire, 28 by 3.

VULCAN

Model 35 a new four-cylinder

UNDER the model number of 35, the Vulcan company has brought out a new car for this season. It is fitted with a Buda four-cylinder 3.5 by 5.125 power plant, multiple-disk clutch, Fuller three-speed gearset, three-quarter floating rear axle and is mounted on a chassis of 120 inches wheelbase. This chassis is provided with a five-passenger touring body of streamline design.

The L-head cylinders are cast in a block and are provided with integral water jackets which are so baffled that the water is discharged directly beneath the valves and to circulate entirely around these cylinders. The top of the cylinders is provided with a cover which can be removed, allowing access to the water jackets. The base flange of the cylinder casting is continued horizontally to form a housing for the valve lifter guides.

A combination splash and pressure system takes care of the oiling. A gear pump takes the oil from the lower half of the crankcase to the tops of the main bearings and the lubricant flows from these to the splash trough.

In the clutch there are eight plates lined with Raybestos. These deliver the power to the three-speed gearset, which is mounted on ball-bearings, transmitting the power to a Salisbury three-quarter floating rear axle. The springs are cantilever design, 48 inches in length. Steering is by worm and wheel.

The body lines are continuous following

the dictates of streamline fashion and provide 24.5 inches leg-room in the rear and 33 inches leg room in the front.

WILLYS-KNIGHT

Principal changes in bodies and price

MODEL K-19 is the new Willys-Knight which replaces model K-17 of last year. The changes are principally in the body and in the price, the new machine selling for \$2,475, or \$275 under the previous model. The only mechanical differences are in the rear-axle housing and the slightly changed design of the four-speed gearset. A new streamline design of body with sloping hood and cowl uniting it with the body proper, has replaced the former straight bonnet with a break in line between the hood and body.

The motor is a Knight type with sliding sleeve valves. The cylinders with dimensions of 4 by 5½ inches, are cast in pairs and have removable heads. The engine incorporates a five-bearing crankshaft, and has the sleeves moved up and down by small connecting rods, eccentrically carried on a shaft. It is a standard Knight design.

The rear axle, with its new and lighter housing, is still a worm drive type, the worm being carried under the worm wheel, and thus running continually in a bath of oil. The ratio is 4.83 to 1. Drive comes back to it through a cone clutch and open drive shaft which has two universals. The gearset has four speeds ahead, selectively obtained and located in the center of the chassis.

The rear spring suspension is still of the Lanchester cantilever form, with these springs measuring 52 by 2¼ inches. They attach at two points outside the side frame rails and at their rear to the axle tubes.

WINTON

New six at \$2,285 added

WINTON'S surprise for the year is a new six-cylinder, model 21A, selling for \$2,285 in four or five-passenger form and showing general chassis design like the model 21, which is continued practically unchanged with the exception of the body, which is a redesigned one. Thus the Winton company has abandoned its one-chassis policy to which it has adhered for 5 years.

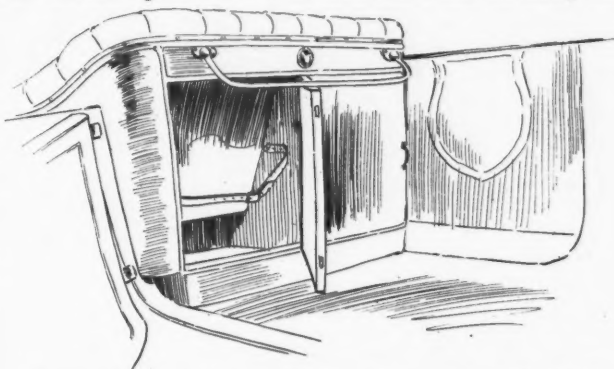
The new six is somewhat smaller than the model 21. The wheelbase is 128 inches and the motor, which it has its cylinder cast in pairs like the other Winton model, is 3½ by 5¼. The design is L-head and all moving parts are completely inclosed. The valves are tungsten-steel and driven by a camshaft which is a one-piece forging. This camshaft may be removed very easily

through the front of the crankcase. Four Parson's-brass bearings support the crankshaft. This motor is equipped with Bosch ignition and a Bijur cranking and lighting system. Circulating splash oiling is used and cooling by centrifugal pump.

The clutch is a dry disk with eleven unlined plates attached to the driving shaft and five fabric-lined to the flywheel drum. The gearset is a four-speed type and drives by a practically horizontal shaft to a floating axle fitted with any one of five gear ratios.

Seven body types are mounted on this new Winton and they here follow with the prices: Roadster, four and five-passenger touring cars, \$2,285; limousine, \$3,250; berline, \$3,500; landaulet, \$3,500, and sedan, \$3,500. The chassis alone sells for \$2,000. The tires are 36 by 4½ all around.

The model 21 is continued with practically no change, but bodies have been redesigned so as to connect body with bonnet in a graceful curve, to give more room to the front seat and to bring out



Luggage space in the back of the front seat of the Winton. Note also the tonneau light near the front seat upholstery

even more forcibly the streamline effect. A raised panel which outlines the upper edge of the body all around has been added and does much to enhance the general appearance.

The radiator, as compared with the cars marketed before last July, is 2 inches higher and 2½ inches wider, affording a 14 percent greater cooling capacity to the 4½ by 5½ six-cylinder engine which is left as it was. Dann oil-cushion inserts have been incorporated between the leaves of the springs, which make them more resilient and promote easy riding.

On the motor, an equipment change is the adoption of Rayfield carbureter, while electric cranking has been made optional, the Winton air system of turning the crankshaft for starting, which method was used exclusively on cars prior to 1914, being fitted instead, as desired. The ignition is supplied by either Mea or Bosch magneto with storage battery to take care of auxiliary starting current. A shield has been placed around the fan, which directs the air to the cylinders and also acts as a safety feature.

The Winton uses a multiple-disk clutch of sixty-three plates, thirty-two driving and thirty-one driven. This clutch is

housed in the forward end of the gearcase which is mounted amidships. It affords four forward speeds with direct on third, fourth being geared up somewhat.

Tires have been increased from 36 by 4½ to 37 by 5, while prices are not altered, being \$3,500 for the seven-passenger and \$3,250 for roadster, four-passenger and five-passenger.

WHITE

Six built only to order

LISTING only two four-cylinder models and building the six to custom order is one example of the practical discontinuance of the six. This is the White policy, the fours being generally improved, fitted with an entirely line of new bodies and slightly increased in price. One dominant factor is the lower bodies, the frames being but 25 inches from the ground, yet allowing for a clearance of 10 inches under the apron. In the large four this lowering is accomplished first by underslinging the three-quarter elliptic rear spring, second by dropping the frame side members and lastly by dropping the front axle between the spring seatings and the steering knuckles.

The chassis has been altered in many respects notwithstanding the continuation of block-type cylinders with integral manifolds, four-speed gearsets and disk clutches. The Entz motor-generator, heretofore under the hood, is located at the right rear of the chassis, approximately under the tonneau floor and in this new position is driven by a forward shaft and sprocket and silent chain from the flywheel. The new position is more accessible and the drive is not through the timing gears as formerly. A great improvement has been made in the wiring, all of which is brought to a junction box on the front of the dash immediately over the steering column of the car.

Gasoline feed is by the Stewart vacuum system, which permits the carburetor being carried much higher, being directly bolted to the side of the casting, and also allows of a rear gasoline tank on all models. All motor and lighting controls are mounted on the forward side of the steering column below the wheel, the control box being a cylinder placed transversely on the column. A new form of clutch brake is intended to stop spinning in gear shifting, and there is now an equalizer in the service brake as well as in the emergency one. All lights take 21-volt bulbs. The oil reservoir is removed from the side of the motor and placed on the forward side of the dash; Silvertown cord tires are stock equipment.

Bodies are new streamline creations, with a flaring hood, which leads into a heavy cowl with a backward curve, directing the eye to the seat line. Back of the front seat is a center cowl, which aids in carrying out the streamline design. The bodies are widest in rear of the front seats.

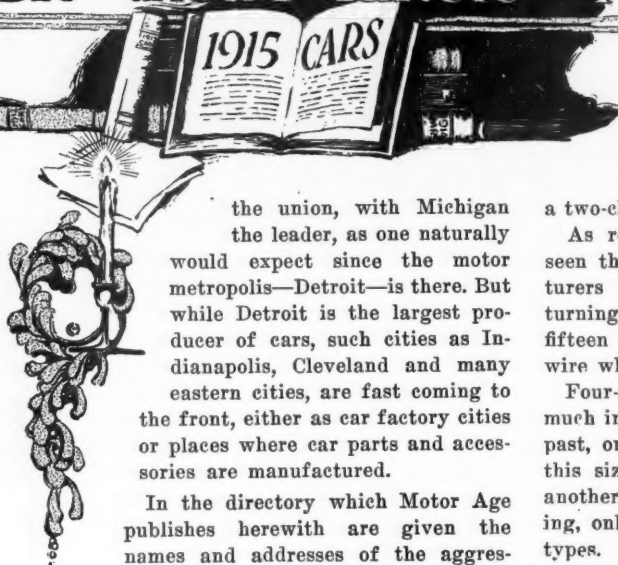
American Cars—their Makers and Addresses

THE third largest industry in the United States—the motor car industry—while it has lost in the number of manufacturers, has increased to a great extent as regards the number of vehicles produced, the figure having risen from 450,000 cars in 1913 to 515,000 in 1914 and is assured that 1915 will see an even greater increase.

At present American manufacturers can boast of having more than 1,750,000 motor cars registered in the various states with New York leading with more than 160,000 cars. Illinois, Pennsylvania, Ohio, California and Iowa follow in the order named.

The 1914 production is given a valuation of \$485,000,000 and with the 1915 output increased by 20 per cent the valuation for the coming year should be approximately \$582,000,000 for a total of 616,000 motor cars.

This vast production of motor vehicles is contributed to by practically every state in



the union, with Michigan the leader, as one naturally would expect since the motor metropolis—Detroit—is there. But while Detroit is the largest producer of cars, such cities as Indianapolis, Cleveland and many eastern cities, are fast coming to the front, either as car factory cities or places where car parts and accessories are manufactured.

In the directory which Motor Age publishes herewith are given the names and addresses of the aggressive builders of motor cars for 1915 and in the columns to the right of the makers' names will be found valuable information concerning the number and types of cars produced by these builders.

The table shows that the largest number of chassis built by any one concern is five. Both the Apperson company and the Stutz

are such producers. Of the 119 makers listed below fifty-seven offer but one chassis with a wide selection of body styles, while thirty-nine have

a two-chassis line, and fifteen three-chassis.

As regards chassis features it will be seen there are but nineteen car manufacturers building right-drive chassis, three turning out cars with worm-drive axle and fifteen with cars equipped, as stock, with wire wheels.

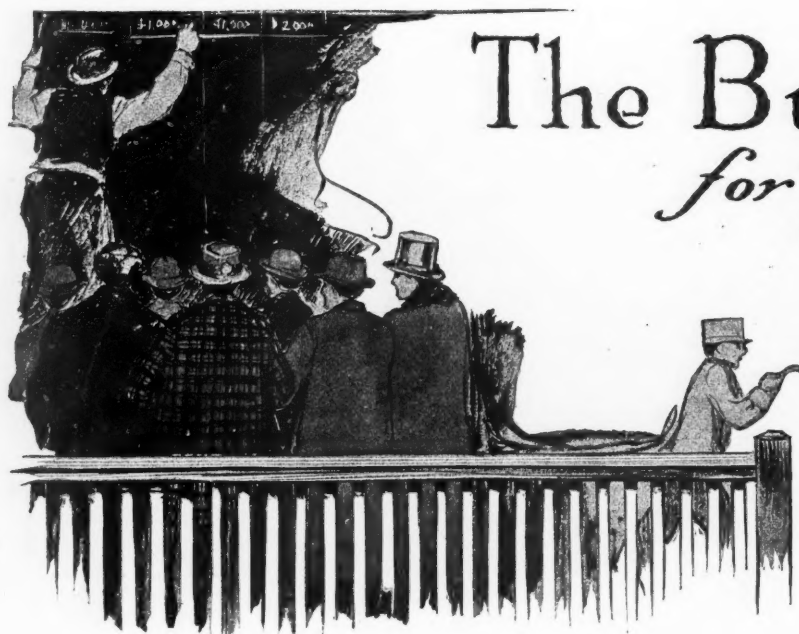
Four-passenger touring cars are not as much in evidence as they have been in the past, only sixteen manufacturers carrying this size body. The six-passenger car is another which has rather a small following, only twenty makers turning out such types. Practically every maker of note is building five and seven-passenger touring cars and some type of inclosed vehicle. The roadster list is large because of the introduction of so many small cars the outgrowth of the cyclecar.

The large inclosed cars listed in the last column, it will be noticed, are built by the majority of high-price makers.

CAR NAME	NAME OF MAKER	ADDRESS	No. Chassis Models	Six-Cylinder	Four-Cylinder	Right Drive	Left Drive	Worm Drive	Wire Wheels	Electric Crankers	Air Crankers	Body Types and Seating Capacity					
												Roadster, 2 & 3	Touring				Coupes
													4	5	6	7	
Abbott-Detroit	Abbott Motor Car Co.	Detroit, Mich.	3	1	2	2	1			3		1		2		2	
Allen	Allen Motor Co.	Fostoria, O.	1		1		1			1		1		2			
Apperson	Apperson Bros. Auto Co.	Kokomo, Ind.	5	4	1		5			5		1		1		2	
Arbenz	Arbenz Car Co.	Chillicothe, O.	1		1	0				1		1		1			
Argo	Argo Motor Co.	Jackson, Mich.	1		1		1		1			1					
Auburn	Auburn Automobile Co.	Auburn, Ind.	3	2	1		3			3		3		1	2		
Austin	Austin Automobile Co.	Grand Rapids, Mich.	1	1			1			1		1		1	1		3
Bauer	Bauer Machine Wks. Co.	Kansas City, Mo.	1		1		1			1		1		1			
Briscoe	Briscoe Motor Car Co.	Jackson, Mich.	1		1	0			0	1		1		2			1
Buick	Buick Motor Co.	Flint, Mich.	3	1	2		3			3		3		1		1	
Cadillac	Cadillac Motor Car Co.	Detroit, Mich.	1		*		1			1		1		1		1	4
Cartecar	Cartecar Co.	Pontiac, Mich.	1		1	1				1		1		1			
Case	J. I. Case T. M. Co.	Racine, Wis.	3		3	1	2			3		1		3		1	
Chadwick	Chadwick Eng. Works.	Pottstown, Pa.	2	2		2				2		1		1		2	1
Chalmers	Chalmers Motor Co.	Detroit, Mich.	3	3			2			2		1		3		1	2
Chandler	Chandler Motor Co.	Cleveland, O.	1	1						1		1		1			2
Chevrolet	Chevrolet Motor Co.	Flint, Mich.	2		2		2			1		1		1			
Cole	Cole Motor Car Co.	Indianapolis, Ind.	3	2	1		3			3		2	1			2	3
Corbitt	Corbitt Automobile Co.	Henderson, N. C.	1		1	1				1		1		1			
Crawford	Crawford Automobile Co.	Hagerstown, Md.	1	1			1			1		1		1			
Crow-Elkhart	Crow Motor Car Co.	Elkhart, Ind.	3	1	2	3				3		3	2	3	2		
Cunningham	Jas. Cunningham Son & Co.	Rochester, N. Y.	1		1					1		1				1	2
Cycleplane-Tourist	Cycleplane	Westerly, R. I.	2	**	1	**	1		2			3					
Davis	Geo. W. Davis Carriage Co.	Richmond, Ind.	2	1	1		2			2		1		2	1		
Detroit	Briggs-Detroit Co.	Detroit, Mich.	1		1		1			1		1					
Dile	Dile Motor Car Co.	Reading, Pa.	1		1		1		1			1					
Dodge	Dodge Bros.	Detroit, Mich.	1		1		1			1		1		1			
Dorris	Dorris Motor Car Co.	St. Louis, Mo.	1		1		1			1		1		1		1	2
Empire	Empire Automobile Co.	Indianapolis, Ind.	1		1	1				1		2		2			
Enger	Enger Motor Car Co.	Cincinnati, O.	1	1			1			1		1				1	
Fiat	Fiat Automobile Co.	Poughkeepsie, N. Y.	2	1	1	2			0	2		4		2		2	6
Firestone-Columbus	New Columbus Buggy Co.	Columbus, O.	2	1	1		2			2		1		2		1	
Ford	Ford Motor Co.	Detroit, Mich.	1		1		1			1		1		1			2
Franklin	H. H. Franklin Mfg. Co.	Syracuse, N. Y.	1	1			1			1		1		1			2
F. R. P.	F. R. P. Motor Co.	Port Jefferson, L. I.	1		1	1			1	1							
Glide	Bartholomew Co.	Peoria, Ill.	1		1		1			1		1		1			
Grant	Grant Motor Co.	Detroit, Mich.	2	1	1		2		1	2		2		1			
Great Western	Great Western Auto Co.	Peru, Ind.	2		2	1	1			2		2	2	1	1		2
Haynes	Haynes Automobile Co.	Kokomo, Ind.	3	2	1		3			3		1	1	3			
Herff-Brooks	Herff-Brooks Co.	Indianapolis, Ind.	2	1	1		2			2		2		2			
Herreshoff	Herreshoff Light Car Co.	Troy, N. Y.	1		1		1		1	1		1					
Hudson	Hudson Motor Car Co.	Detroit, Mich.	2	2			2			2		1				1	7
Hupp	Hupp Motor Car Co.	Detroit, Mich.	2		2	1	1			2		2		2			

CAR NAME	NAME OF MAKER	ADDRESS	No. Chassis Models	Six-Cylinder	Four-Cylinder	Right Drive	Left Drive	Worm Drive	Wire Wheels	Electric Crankers	Air Crankers	Body Types and Seating Capacity						
												Roadster, 2 & 3	Touring				Coupe	Large Enclosed Cars
													4	5	6	7		
Imperial	Imperial Automobile Co.	Jackson, Mich.	2	1	1		2			2				1		1		
Inter-State	Inter-State Auto. Co.	Muncie, Ind.	1		1									1				
Jackson	Jackson Automobile Co.	Jackson, Mich.	2	1	1		2			2		1		2				
Jeffery	Thos. B. Jeffery Co.	Kenosha, Wis.	3	2	1		3	1		3		2		2		1		4
Kearns	Kearns Motor Truck Co.	Beavertown, Pa.	1		1		0			1		2						
King	King Motor Car Co.	Detroit, Mich.	2		1		2			2		2		2				1
Kissel	Kissel Motor Co.	Milwaukee, Wis.	2		1		2			2		3		5		3		5
Kline	Kline Motor Car Corp.	Richmond, Va.	2		2		2			2		1		1		1		
Krit	Krit Motor Car Co.	Detroit, Mich.	2		2		2			2		2		2				1
Lambert	Buckeye Mfg. Co.	Anderson, Ind.	2		2	1	1			2		1		2				
Lenox	Lenox Motor Co.	Boston, Mass.	2	1	1		2		0	2		2		2				
Lewis	L. P. C. Motor Co.	Racine, Wis.	1	1	1		1			1		1			1			
Lexington	Lexington-Howard Co.	Connersville, Ind.	2	2			2			2		2		1	1	1		2
Locomobile	Locomobile Co. of America	Bridgeport, Conn.	2	2			2		0	2		2		1	1	1		6
Louverne	Louverne Automobile Co.	Louverne, Minn.	1	1			1			1		1		1	1	1		
Lyons-Knight	Lyons-Atlas Co.	Indianapolis, Ind.	1		1		1	1		1		1		1		1		2
Maxwell	Maxwell Motor Co.	Detroit, Mich.	1		1		1			1		1		1				
McFarlan	McFarlan Motor Co.	Connersville, Ind.	2	2			2			2	2	2	2	2	2	2		
McIntyre	W. H. McIntyre Co.	Auburn, Indiana	2	1	1	1	1			2		2		2				
Meteor	Meteor Motor Car Co.	Shelbyville, Ind.	2	1	1		2			2		2		2				
Metz	Metz Co.	Waltham, Mass.	1		1		1			1		1						
Mitchell-Lewis	Mitchell-Lewis M. C. Co.	Racine, Wis.	4	3	1		4			4		3		3	3	1		
Moline-Knight	Moline Automobile Co.	East Moline, Ill.	1		1		1		0	1		1		1		1		2
Monarch	Nordyke & Monarch Co.	Indianapolis, Ind.	2	2			2			2		1	1	1		2		3
Monarch	Monarch Motor Car Co.	Detroit, Mich.	1	1			1			1		1		1		1		
Moon	Moon Motor Car Co.	St. Louis, Mo.	2	1	1		2			2		2		1	1	1		
Morse	Morse Motor Car Co.	Brookline, Mass.	1		1	1				1		1		1		1		
National	National Motor Veh. Co.	Indianapolis, Ind.	1	1			1			1		1		1	1		1	3
Norwalk	Norwalk Motor Car Co.	Martinsburg, W. Va.	1	1			1			1		1		1	1			
Oakland	Oakland Motor Car Co.	Pontiac, Mich.	2	1	1		2			2		1		1		1		
Oldsmobile	Olds Motor Works	Lansing, Mich.	2	1	1		2			2		1		1		1		
Overland	Willys-Overland Co.	Toledo, O.	3	1	2		3			3		2		2		1		
Owen	R. M. Owen & Co.	Toledo, O.	1	1			1		0	1		1				1		
Packard	Packard Motor Car Co.	Detroit, Mich.	2	2			2			2		2			2	2	2	14
Paige-Detroit	Paige-Detroit M. C. Co.	Detroit, Mich.	2	1			1			1		1				1		
Partin	Partin Mfg. Co.	Chicago	1		2		2			2		1			1			
Paterson	W. A. Paterson Co.	Flint, Mich.	2	1	1		2			1		1		2		1		
Pathfinder	Motor Car Mfg. Co.	Indianapolis, Ind.	1	1			1			1		3				1		
Peerless	Peerless Motor Car Co.	Cleveland, O.	3	2	1	0	2			3	m	1		2		1		10
Peter Pan	Randall Co.	Norfolk Downs, Mass.	1		1		1			1		1		1				
Pierce-Arrow	Pierce-Arrow Motor Car Co.	Buffalo, N. Y.	3	3			3			3		3		3		2	3	4
Pilot	Pilot Motor Car Co.	Richmond, Ind.	2	2			1			2		2		2		1		1
Pratt	Elkhart Car. & Harn. Mfg. Co.	Elkhart, Ind.	2	1	1		1			1		2		2		1		
Premier	Premier Motor Mfg. Co.	Indianapolis, Ind.	1	1			1			1		2		2		1		3
Pullman	Pullman Motor Car Co.	York, Pa.	2	1	1		2			1		1						
Rayfield	Rayfield Motor Co.	Chrisman, Ill.	1		1		1		1	n		1						
R. C. H.	R. C. H. Corp.	Detroit, Mich.	1		1	0				1		1		1				
Regal	Regal Motor Car Co.	Detroit, Mich.	1		1	0				1		1		1				
Remington	Remington Motor Co.	New York City	3	1	2		3			3		1		1				
Reo	Reo Motor Car Co.	Lansing, Mich.	3	1	2		3			3		1		1		1		
Republic	Republic Motor Car Co.	Hamilton, O.	1	1			1			1		1		1		1		
Saxon	Saxon Motor Co.	Detroit, Mich.	2	1	1		2		1			1		1			1	
Scripps-Booth	Scripps-Booth Co.	Detroit, Mich.	1		1		1		1			1		1				5
S. G. V.	S. G. V. Co.	Reading, Pa.	2		1		2			1		1		1				
Simplex	Simplex Automobile Co.	New Brunswick, N. J.	1		2	2				1		1		1				
Singer	Singer Motor Co.	Long Island City	1	1			1		0			1		1				
Spaulding	Spaulding Mfg. Co.	Grinnell, Iowa	1	1	1		1			1		1		1				1
Speedwell	Speedwell Motor Car Co.	Dayton, O.	1	1	1		1			1		1				1		
Sphinx	Sphinx Motor Co.	York, Pa.	3	1	2		3			3		2		2	3	2		6
Stearns	F. B. Stearns Co.	Cleveland, O.	2	2			2			2		1		1		1		7
Stevens-Duryea	Stevens-Duryea Co.	Chicopee Falls, Mass.	2	1	1		2			2		1		2		1		
Studebaker	Studebaker Corp.	Detroit, Mich.	5	2	3	5				5		5		2				3
Stutz	Stutz Motor Car Co.	Indianapolis, Ind.																
Touraine	Touraine Co.	Philadelphia, Pa.	2	2			2			2		1		1		1	1	
Trumbull	American Cyclecar Co.	Bridgeport, Conn.	1		1	0			1	1	0	1					1	
Twombly	Twombly Car Corp.	New York City	1				1	1	1	0	0	1						
Veline	Veline Motor Vehicle Co.	Moline, Ill.	3	2	1		3			3		3	1	3	1			4
Vixen	Davis Mfg. Co.	Milwaukee, Wis.	1		1		1			n	n	1						
Vulcan	Vulcan Mfg. Co.	Painesville, O.	1		1	1			1	1		1		1				
Westcott	Westcott Motor Car Co.	Richmond, Ind.	2	1	1		2			2		2		1	1			1
White	White Co.	Cleveland, O.	3	1	2		3			3		1		1		3		4
Willys-Knight	Garford Co.	Elvria, O.	1		1		1		1	1		1		1				
Winton	Winton Motor Car Co.	Cleveland, O.	2	2			2			0		2		2		2		10
Zimmerman	Zimmerman Mfg. Co.	Auburn, Ind.	1	1												1		





The Buyers Guide for 1915



CONTRARY to the expected, motor car manufacturers are making more complete cars this year than in 1914, in excess of 600 different vehicles being offered to the prospective purchaser. These 600 or more cars show a greater price range than ever before in the history of the motor car industry. For the first time a car showing standard construction is listed at below \$300 and also for the first time six-cylinder cars are being listed in the lowest price class. The vast price range enables one to select any car from the \$295 four-cylinder Argo to the \$7,000 Pierce-Arrow landau.

The six-cylinder cars found in the lowest price class are the Grant at \$750 and the Saxon at \$785, the former, however, not being equipped with a cranking and lighting system at the price named. An additional \$45 is charged for this equipment.

The presence of a number of small vehicles has increased the list in this class and the observer will see such new names as Argo, Dodge, Kearns, Peter Pan, Scripps-Booth, Vixen and Twombly. There also are a number of prominent makers, who heretofore catered to the more expensive

MOTOR AGE presents on this and the four succeeding pages its annual price classification of American-made passenger cars. The cars are arranged in four classes, according to price, and their specifications given in brief, so that the prospective purchaser can determine at a glance which cars come within his means and fulfill his requirements as to seating capacity, horsepower, wheelbase, etc. The four price classes are: the \$4,000 division in which are placed all cars whose cost is over \$3,000; the \$2,500 division in which are those vehicles whose prices range from \$2,000 to \$2,999 inclusive; the \$1,500 class which embraces passenger vehicles costing \$1,250 to \$1,999 inclusive and the \$1,000 class, which is set aside for all cars selling for less than \$1,250. The prices given in the buyers' guide include all the accessories usually referred to as stock equipment which includes, in nearly every instance, top—with side curtains—windshield, speedometer, horn of some description, tools, and lamps. In many cases, more than the appurtenances mentioned are given.

trade, who have come into the low-price classification for the first time. These include Allen, Auburn, Davis, Glide, Interstate, Pullman, and Westcott.

Cars ranging in price from \$1,250 to \$1,299 have lost in number of manufacturers but there is a surprise to be seen in this class in the shape of two eight-cylinder

cars, the Cadillac and King, the former listed at \$1,875 and the latter at \$1,350. There is not one new maker in this class but Oldsmobile and Norwalk are two which heretofore appeared only in the higher-priced classes.

The drop in the average price also is rather large in the \$1,500 class, the average for 1915 being \$1,419, and for 1914 it was \$1,650. At the price named the average car of this class has an L-head 3.78 by 5.21 six-cylinder block-cast motor.

In the \$2,500 class the price reduction is not so marked, the figures being \$2,460 for 1914 and \$2,454 for 1915, while in the highest price classification there has been a reduction of \$137 in the price of the average vehicle, the 1915 list being \$4,563.

Two unusual cars are new to the latter class. The F. R. P. is one, with a four-cylinder overhead-valve motor and showing exceptional power and speed. The chassis alone sells for \$5,000. Another is the R. M. Owen car, which uses an electric transmission, the first car of its type produced.

The Chalmers company has brought out a new six with an overhead camshaft and due to late announcement is not listed.

Motor Cars for 1915 Season Costing More than \$3,000

NAME AND MODEL	Body, Style and Seating Capacity	Price	No. of Cylinders	S. A. E. H. P.	Wheelbase Inches	Tire Size Inches	Location of Steering
Austin, 66.....	Roadster, 2.....	3,600	6	48.60	141	34x4	Left
Austin, 66.....	Close Cpld, 4.....	3,600	6	48.60	141	34x4	Left
Austin, 66.....	Touring, 6.....	3,600	6	48.60	141	34x4	Left
Austin, 66.....	Touring, 7.....	3,600	6	48.60	141	34x4	Left
Austin 66.....	Inclosed, 5.....	4,200	6	48.60	141	34x4	Left
Austin, 66.....	Limousine, 7.....	4,700	6	48.60	141	34x4	Left
Cadillac, 51.....	Limousine, 7.....	3,450	8	31.28	122	36x4	Left
Cadillac, 51.....	Berline, 7.....	3,600	8	31.28	122	36x4	Left
NAME AND MODEL	Body, Style and Seating Capacity	Price	No. of Cylinders	S. A. E. H. P.	Wheelbase Inches	Tire Size Inches	Location of Steering
Chadwick, 19.....	Roadster, 2.....	5,500	6	60.00	112	37x5*	Right
Chadwick, 19.....	Touring, 5.....	5,500	6	60.00	133	37x5*	Right
Chadwick, 19.....	Touring, 7.....	5,500	6	60.00	133	37x5*	Right
Chadwick, 19.....	Limousine, 7.....	6,500	6	60.00	133	37x5*	Right
Chalmers, 26-B.....	Limousine, 7.....	3,200	6	29.45	123½	34x4	Left
Cole, 6.....	Coupe, 4.....	3,000	6	43.80	136	36x4	Left

*Rear tires only; front a size smaller.

Motor Cars Costing More than \$3,000—Continued

NAME AND MODEL	Body, Style and Seating Capacity	Price	No. of Cylinders	S. A. E. H. P.	Wheelbase Inches	Tire Size Inches	Location of Steering
Cunningham, S.	Touring, 7	3,750	4	36.15	129	37x5	Left
Cunningham, S.	Limousine, 7	5,000	4	36.15	129	37x5	Left
Cunningham, S.	Landaulet, 7	5,000	4	36.15	129	37x5	Left
Dorris, 1-A-4	Limousine, 7	3,400	4	30.54	121	36x4	Left
Fiat, 55	Roadster, 2	4,650	4	42.20	128	37x5	Right
Fiat, 55	Roadster, 3	4,650	4	42.20	128	37x5	Right
Fiat, 55	Touring, 5	4,650	4	42.20	128	37x5	Right
Fiat, 55	Touring, 7	4,650	4	42.20	128	37x5	Right
Fiat, 55	Limousine, 7	5,650	4	42.20	128	37x5	Right
Fiat, 55	Landaulet, 7	5,750	4	42.20	128	37x5	Right
Fiat, 55	Berline, 7	5,950	4	42.20	128	37x5	Right
Fiat, 55	Roadster, 2	5,150	6	46.00	135	37x5	Right
Fiat, 55	Touring, 5	5,150	6	46.00	135	37x5	Right
Fiat, 55	Touring, 7	5,150	6	46.00	135	37x5	Right
Fiat, 55	Roadster, 3	5,150	6	46.00	135	37x5	Right
Fiat, 55	Limousine, 7	6,150	6	46.00	135	37x5	Right
Fiat, 55	Landaulet, 7	6,250	6	46.00	135	37x5	Right
Fiat, 55	Berline, 7	6,450	6	46.00	135	37x5	Right
Franklin	Sedan, 5	3,000	6	31.57	120	34x4	Left
Franklin	Berline, 6	3,200	6	31.57	120	34x4	Left
F. R. P., 45 B	Chassis	5,000	4	32.40	110-140	36x5	Right
Great Western, B.	Coupe, 2	3,800	4	22.50	117	34x4	Left
Great Western, B.	Sedan, 4	4,000	4	22.50	117	34x4	Left
Great Western, B.	Limousine, 6	4,800	4	22.50	117	34x4	Left
Haynes, 31	Coupe, 4	3,000	6	43.50	130	36x4	Left
Hudson, 6-54	Sedan, 5	3,100	6	40.80	135	36x4	Left
Hudson, 6-54	Limousine, 7	3,500	6	40.80	135	36x4	Left
Kissel, 6-60	Roadster, 2	3,150	6	48.60	142	37x5	Left
Kissel, 6-60	Touring, 7	3,150	6	48.60	142	37x5	Left
Kissel, 6-60	Limousine, 7	4,900	6	48.60	142	37x5	Left
Lexington, 6 M	Limousine, 7	3,550	6	40.80	130	36x4	Left
Locomobile, M-5	Roadster, 2	5,100	6	48.60	140	37x5	Left
Locomobile, M-5	Touring, 6	5,100	6	48.60	140	37x5	Left
Locomobile, M-5	Touring, 7	5,100	6	48.60	140	37x5	Left
Locomobile, M-5	Limousine, 7	6,200	6	48.60	140	37x5	Left
Locomobile, M-5	Landaulet, 7	6,300	6	48.60	140	37x5	Left
Locomobile, M-5	Berline, 7	6,500	6	48.60	140	37x5	Left
Locomobile, R-4	Roadster, 2	4,400	6	43.50	132	37x5	Left
Locomobile, R-4	Touring, 5	4,400	6	43.50	132	37x5	Left
Locomobile, R-4	Touring, 7	4,400	6	43.50	132	37x5	Left
Locomobile, R-4	Limousine, 7	5,400	6	43.50	132	37x5	Left
Locomobile, R-4	Landaulet, 7	5,500	6	43.50	132	37x5	Left
Locomobile, R-4	Berline, 7	5,700	6	43.50	132	37x5	Left
Lyons-Knight	Sedan, 5	3,900	4	32.40	130	37x5	Left
Lyons-Knight	Limousine, 7	4,300	4	32.40	130	37x5	Left
Marmon, 41	Speedster, 2	3,250	6	43.50	132	36x4	Left
Marmon, 41	Roadster, 2	3,250	6	43.50	132	36x4	Left
Marmon, 41	Touring, 4	3,250	6	43.50	132	36x4	Left
Marmon, 41	Touring, 5	3,250	6	43.50	132	36x4	Left
Marmon, 41	Touring, 7	3,350	6	43.50	132	36x4	Left
Marmon, 41	Limousine, 7	4,750	6	43.50	132	36x4	Left
Marmon, 41	Landaulet, 7	4,850	6	43.50	132	36x4	Left
Marmon, 41		5,350	6	43.50	132	36x4	Left
Marmon, 48	Touring, 7	3,000	6	48.60	145	37x5	Left
Moline-Knight	Sedan, 5	3,250	4	25.60	128	36x4	Left
Moline-Knight	Limousine, 7	3,800	4	25.60	128	36x4	Left
Morse, D.	Roadster, 2-3	3,600	4	34.28	127	36x4	Right
Morse, D.	Touring, 5	3,600	4	34.28	127	36x4	Right
Morse, D.	Touring, 7	3,600	4	34.28	127	36x4	Right
R. M. Owen	Roadster, 3	3,500	6	31.57	136	35x5	Left
R. M. Owen	Touring, 7	3,500	6	31.57	136	35x5	Left
Packard, 3-38	Roadster, 2	3,750	6	38.40	140	37x5	Left
Packard, 3-38	Touring, 6	3,350	6	38.40	140	37x5	Left
Packard, 3-38	Salon Tour, 6	3,850	6	38.40	140	37x5	Left
Packard, 3-38	Touring, 7	3,850	6	38.40	140	37x5	Left
Packard, 3-38	Phaeton, 5	3,750	6	38.40	140	37x5	Left
Packard, 3-38	Limousine, 7	5,000	6	38.40	140	37x5	Left
Packard, 3-38	Limousine, 7	4,950	6	38.40	140	37x5	Left
Packard, 3-38	Limousine, 6	4,950	6	38.40	140	37x5	Left
Packard, 3-38	Coupe, 3	4,450	6	38.40	140	37x5	Left
Packard, 3-38	Landaulet, 7	5,000	6	38.40	140	37x5	Left
Packard, 3-38	Landaulet, 7	4,950	6	38.40	140	37x5	Left
Packard, 3-38	Landaulet, 6	4,900	6	38.40	140	37x5	Left
Packard, 3-38	Roadster, 2	4,750	6	48.60	144	37x5	Left
Packard, 3-38	Touring, 7	4,850	6	48.60	144	37x5	Left
Packard, 3-38	Touring, 6	4,850	6	48.60	144	37x5	Left
Packard, 3-38	Phaeton, 5	4,750	6	48.60	144	37x5	Left
Packard, 3-38	Limousine, 7	5,950	6	48.60	144	37x5	Left
Packard, 3-38	Limousine, 6	5,900	6	48.60	144	37x5	Left
Packard, 3-38	Coupe	5,450	6	48.60	144	37x5	Left
Packard, 3-38	Landaulet, 7	6,000	6	48.60	144	37x5	Left
Packard, 3-38	Brougham, 6	6,000	6	48.60	144	37x5	Left
Peerless, 54	Sedan, 5	3,100	4	22.50	113	34x4	Left
Peerless, 54	Limousine, 7	3,100	4	22.50	113	34x4	Left
Peerless, 55	Sedan, 5	3,350	6	29.45	121	34x4	Left
Peerless, 55	Limousine, 7	3,350	6	29.45	121	34x4	Left
Peerless, 48	Roadster, 3	4,900	6	48.60	137	37x5	Opt.
Peerless, 48	Touring, 7	5,000	6	48.60	137	37x5	Opt.
Peerless, 48	Limousine, 7	6,000	6	48.60	137	37x5	Opt.
Peerless, 48	Sedan, 5	5,900	6	48.60	137	37x5	Opt.
Peerless, 48	Landaulet, 7	6,100	6	48.60	137	37x5	Opt.
Peerless, 48	Berline, 7	6,200	6	48.60	137	37x5	Opt.
Pierce-Arrow, 38	Roadster, 3	4,300	6	38.40	134	36x4	Right
Pierce-Arrow, 38	Touring, 5	4,300	6	38.40	134	36x4	Right
Pierce-Arrow, 38	Touring, 4	4,300	6	38.40	134	36x4	Right
Pierce-Arrow, 38	Coupe, 2	4,575	6	38.40	134	36x4	Right
Pierce-Arrow, 38	Brougham, 7	5,200	6	38.40	134	36x4	Right
Pierce-Arrow, 38	Landaulet, 7	5,350	6	38.40	134	36x4	Right
Pierce-Arrow, 43	Roadster, 3	4,900	6	48.60	142	37x5	Right
Pierce-Arrow, 43	Touring, 5	4,900	6	48.60	142	37x5	Right
Pierce-Arrow, 43	Touring, 4	4,900	6	48.60	142	37x5	Right
Pierce-Arrow, 43	Coupe, 2	5,175	6	48.60	142	37x5	Right
Pierce-Arrow, 43	Touring, 7	5,000	6	48.60	142	37x5	Right
Pierce-Arrow, 43	Landau, 7	6,000	6	48.60	142	37x5	Right
Pierce-Arrow, 66	Roadster, 3	5,900	6	60.00	147	38x5	Right
Pierce-Arrow, 66	Touring, 5	5,900	6	60.00	147	38x5	Right
Pierce-Arrow, 66	Touring, 4	5,900	6	60.00	147	38x5	Right
Pierce-Arrow, 66	Touring, 7	6,000	6	60.00	147	38x5	Right
Pierce-Arrow, 66	Coupe, 2	6,175	6	60.00	147	38x5	Right
Pierce-Arrow, 66	Landau, 7	7,000	6	60.00	147	38x5	Right
Pullman, 6-48	Sedan, 4	3,200	6	33.75	134	36x4	Left
Pullman, 6-48	Limousine, 7	3,500	6	33.75	134	37x4	Left
Republic, E.	Touring, 4	3,000	6	29.00	133	36x4	Left
Republic, E.	Touring, 5	3,000	6	29.00	133	36x4	Left
Republic, E.	Touring, 7	3,000	6	29.00	133	36x4	Left
S. G. V. J.	Roadster, 2	3,300	4	24.22	118	34x4	Left
S. G. V. J.	Touring, 5	3,300	4	24.22	118	34x4	Left
S. G. V. J.	Limousine, 6	4,000	4	24.22	118	34x4	Left
S. G. V. J.	Brougham, 6	4,000	4	24.22	118	34x4	Left
S. G. V. J.	Landaulet, 6	4,000	4	24.22	118	34x4	Left
S. G. V. J.	Sedan, 4	4,000	4	24.22	118	34x4	Left
S. G. V. J.	Landau, 6	4,300	4	24.22	118	34x4	Left
Simplex, 38	Chassis	4,000	4	38.25	137	37x5	Right
Simplex, 50	Chassis	4,500	4	46.34	137	37x5	Right
Stearns, Big 4	Roadster, 3	3,750	4	29.00	121	36x4	Left
Stearns, Big 4	Touring, 4	3,750	4	29.00	121	36x4	Left
Stearns, Big 4	Touring, 5	3,750	4	29.00	121	36x4	Left
Stearns, Big 4	Touring, 6	3,900	4	29.00	121	36x4	Left
Stearns, Big 4	Touring, 7	3,900	4	29.00	121	36x4	Left
Stearns, Big 4	Limousine, 7	5,000	4	29.00	121	36x4	Left
Stearns, Big 4	Landaulet, 7	5,100	4	29.00	121	36x4	Left
Stearns, Big 4	Roadster, 3	4,850	6	43.50	140	37x5	Left
Stearns, Big 4	Touring, 4	4,850	6	43.50	140	37x5	Left
Stearns, Big 4	Touring, 5	4,850	6	43.50	140	37x5	Left
Stearns, Big 4	Touring, 6	5,000	6	43.50	140	37x5	Left
Stearns, Big 4	Touring, 7	5,000	6	43.50	140	37x5	Left
Stearns, Big 4	Limousine, 7	6,100	6	43.50	140	37x5	Left
Stearns, Big 4	Landaulet, 7	6,200	6	43.50	140	37x5	Left
Stevens-Duryea, D-6	Roadster, 3	4,550	6	30.65	131	37x4	Left
Stevens-Duryea, D-6	Touring, 5	4,550	6	30.65	131	37x4	Left
Stevens-Duryea, D-6	Demi-Berline, 5	5,750	6	30.65	131	37x4	Left
Stevens-Duryea, D-4	Phaeton, 5	5,400	6	30.65	131	37x4	Left
Stevens-Duryea, D-4	Limousine, 7	5,800	6	30.65	131	37x4	Left
Stevens-Duryea, DD-6	Touring, 7	4,800	6	28.37	138	37x5	Left
Stevens-Duryea, DD-6	Phaeton, 7	5,600	6	28.37	138	37x5	Left
Stevens-Duryea, DD-6	Limousine, 7	6,100	6	28.37	138	37x5	Left
Stevens-Duryea, DD-6	Berline, 7	6,200	6	28.37	138	37x5	Left
Stevens-Duryea, DD-6	Landaulet, 7	6,300	6	28.37	138	37x5	Left
Stutz	Sedan, 6	3,800	6	38.40	120	34x4	Right
Stutz	Sedan, 6	3,675	4	36.15	130	34x4	Right
Touraine, 12	Roadster, 2	3,150	6	38.40	124	34x4	Left
Touraine, 12	Touring, 5	3,150	6	38.40	124	34x4	Left
Touraine, 12	Coupe, 2	4,050	6	38.40	124	34x4	Left
Touraine, 12	Touring, 7	3,250	6	38.40	134	34x4	Left
Touraine, 12	Limousine, 7	4,550	6	38.40	134	34x4	Left
White, 30	Town car, 5	4,000	4	22.50	115	32x4	Left
White, 30	Sedan, 5	4,000	4	22.50	115	32x4	Left
White, 45	Touring, 7	3,800	4	29.00	132	36x4	Left
White, 45	Landaulet, 7	5,200					

Motor Cars for 1915 Costing from \$2,000 to \$2,999

THE only price classification showing cars equipped with all the motor types offered is that shown herewith in which will be found the four Knight-motored cars, the Willys, Moline, Lyons and Stearns, as well as the Speedwell rotary valve. The greater number, of course, are poppet motors. Fours, sixes and eights are listed here, as well as water and air-cooled cars, the

latter type being represented by the single maker—Franklin.

One prominent maker, the Mercer company, is not listed for the reason definite information concerning its 1915 cars has not been made known up to this time. The Winton company has brought out a new six which is listed at \$2,285, but this car is not listed because of its late announcement.

NAME AND MODEL	Body, Style and Seating Capacity	Price	No. of Cylinders	S. A. E. H. P.	Wheelbase Inches	Tire Size Inches	Location of Steering
Abbott-Detroit, L.	Touring, 7.	2,085	4	32.40	121	36x4	Right
Abbott-Detroit, F.	Roadster, 3.	2,190	6	33.75	130	35x4	Left
Abbott-Detroit, F.	Touring, 5.	2,190	6	33.75	130	35x4	Left
Abbott-Detroit, F.	Touring, 7.	2,290	6	33.75	130	35x4	Left
Apperson, 6-60.	Roadster, 2.	2,200	6	40.80	122	36x4	Left
Apperson, 6-60.	Touring, 5.	2,200	6	40.80	128	36x4	Left
Apperson, 6-60.	Touring, 7.	2,350	6	40.80	134	37x4	Left
Auburn, 6-47.	Roadster, 2.	2,000	6	33.75	135	37x4	Left
Auburn, 6-47.	Touring, 6.	2,000	6	33.75	135	37x4	Left
Cadillac, 51.	Land.-Coupe, 3.	2,500	8	31.28	122	36x4	Left
Cadillac, 51.	Sedan, 5.	2,800	8	31.28	122	36x4	Left
Case, 40.	Touring, 7.	2,000	4	32.40	124	37x4	Right
Chalmers, 26 B.	Sedan, 5.	2,750	6	29.45	125	34x4	Left
Chalmers, Master 6.	Touring, 5.	2,400	6	38.40	132	36x4	Left
Chalmers, Master 6.	Touring, 7.	2,400	6	38.40	132	36x4	Left
Chandler, 15.	Sedan, 5.	2,750	6	27.30	120	34x4	Left
Cole, 6-50.	Coupe, 3.	2,250	6	29.45	126	35x4	Left
Crow-Elkhart, E-62.	Roadster, 2.	....	6	33.75	130	36x4	Right
Crow-Elkhart, E-64.	Touring, 4.	....	6	33.75	130	36x4	Right
Crow-Elkhart, E-65.	Touring, 5.	....	6	33.75	130	36x4	Right
Crow-Elkhart, E-66.	Touring, 6.	....	6	33.75	130	36x4	Right
Davis, 6-50.	Touring, 5.	2,150	6	33.75	128	37x4	Left
Davis, 6-50.	Touring, 6.	2,185	6	33.75	128	37x4	Left
Dorris, 1-A-4.	Touring, 5.	2,200	4	30.65	121	36x4	Left
Dorris, 1-A-4.	Touring, 7.	2,250	4	30.65	121	36x4	Left
Dorris, 1-A-4.	Sedan, 4.	2,800	4	30.65	121	36x4	Left
Firestone-Columbus, 98 E.	Touring, 5.	2,500	6	40.80	132	36x4	Left
Firestone-Columbus, 90 E.	Touring, 7.	2,650	6	40.80	132	36x4	Left
Franklin, 6-30 M.	Roadster, 3.	2,150	6	31.57	120	34x4	Left
Franklin, 6-30 M.	Touring, 5.	2,150	6	31.57	120	34x4	Left
Franklin, 6-30 M.	Coupe, 3.	2,600	6	31.57	120	34x4	Left
Great Western, B.	Roadster, 2.	2,200	4	22.50	117	34x4	Left
Great Western, B.	Touring, 4.	2,250	4	22.50	117	34x4	Left
Great Western, B.	Touring, 6.	2,500	4	22.50	117	34x4	Left
Haynes, 32.	Coupe, 4.	2,500	4	29.00	118	34x4	Left
Haynes, 31.	Touring, 4.	2,250	6	43.50	130	36x4	Left
Haynes, 31.	Touring, 5.	2,250	6	43.50	130	36x4	Left
Hudson, 6-40.	Coupe, 4.	2,150	6	29.45	123	34x4	Left
Hudson, 6-40.	Limousine, 6.	2,550	6	29.45	123	34x4	Left
Hudson, 6-40.	Landaulet, 6.	2,700	6	29.45	121	34x4	Left
Hudson, 6-54.	Phaeton, 7.	2,350	6	27.20	135	36x4	Left
Imperial, 56.	Touring, 7.	2,200	6	33.75	130	36x4	Left
Jeffery, 4.	Sedan, 4.	2,250	4	22.50	116	34x4	Left
Jeffery, 4.	Limousine, 7.	2,900	4	22.50	116	34x4	Left
Jeffery, 6.	Touring, 7.	2,400	6	33.75	133	34x4	Left
Kissel, 6-48.	Touring, 5.	2,350	4	25.60	132	36x4	Left
Kissel, 6-48.	Touring, 7.	2,350	4	25.60	132	36x4	Left
Kissel, 6-48.	Roadster, 2.	2,350	4	25.60	132	36x4	Left
Kissel, 6-48.	Touring, 5**.	2,350	4	25.60	132	36x4	Left
Kissel, 6-48.	Sedan, 5.	2,700	4	25.60	132	36x4	Left
Kissel, 6-48.	Cabriolet, 2.	2,650	4	25.60	132	36x4	Left
Kline, 6-42 A.	Limousine, 7.	2,850	6	29.45	127	35x4	Left
Lenox, 4.	Touring, 5.	2,000	4	29.00	118	34x4	Left
Lenox, 6.	Touring, 5.	2,465	6	33.75	130	34x4	Left
Lexington, 6-L.	Sedan, 6.	2,750	6	29.45	128	34x4	Left
Lexington, 6-M.	Touring, 5.	2,575	6	40.80	130	36x4	Left
Lexington, 6-M.	Roadster, 3.	2,575	6	40.80	130	36x4	Left
Lexington, 6-M.	Touring, 7.	2,675	6	40.80	130	36x4	Left
Louverne, 7-60.	Touring, 7.	2,500	6	38.40	128	36x4	Left
Lyons-Knight.	Touring, 5.	2,900	4	32.40	130	37x5	Left
Lyons-Knight.	Touring, 7.	2,980	4	32.40	130	37x5	Left
McFarlan, T.	Roadster, 2.	2,500	6	33.40	132	36x4	Left
McFarlan, T.	Touring, 4.	2,500	6	33.40	132	36x4	Left
McFarlan, T.	Touring, 5.	2,500	6	33.40	132	36x4	Left
McFarlan, T.	Touring, 6.	2,500	6	33.40	132	36x4	Left
McFarlan, T.	Touring, 7.	2,500	6	33.40	132	36x4	Left
McFarlan, X.	Roadster, 2.	2,900	6	48.60	132	36x4	Left
McFarlan, X.	Touring, 4.	2,900	6	48.60	132	36x4	Left
McFarlan, X.	Touring, 5.	2,900	6	48.60	132	36x4	Left
McFarlan, X.	Touring, 6.	2,900	6	48.60	132	36x4	Left
McFarlan, X.	Touring, 7.	2,900	6	48.60	132	36x4	Left
Mitchell, 7-6.	Touring, 7.	2,350	6	43.50	144	37x5	Left
Moline-Knight.	Touring, 7.	2,500	4	25.60	123	36x4	Left
Moline-Knight.	Roadster, 2.	2,500	4	25.60	123	36x4	Left
National, AA.	Roadster, 2.	2,375	6	33.75	124	36x4	Left
National, AA.	Toy-Tonneau, 4.	2,375	6	33.75	132	36x4	Left
National, AA.	Touring, 5.	2,375	6	33.75	132	36x4	Left
National, AA.	Touring, 6.	2,500	6	33.75	132	36x4	Left
National, AA.	Coupe, 4.	2,850	6	33.75	132	36x4	Left
National, AA.	Cabriolet, 3.	2,700	6	33.75	132	36x4	Left
National, AA.	Parlor Car, 4.	2,700	6	33.75	132	36x4	Left
Oldsmobile, 55.	Touring, 7.	2,975	6	43.50	139	36x5	Left
Pathfinder.	Roadster, 4.	2,222	6	33.75	125	34x4	Left
Pathfinder.	Touring, 7.	2,322	6	33.75	125	34x4	Left
Peerless, 54.	Roadster, 3.	2,000	4	22.50	113	34x4	Left
Peerless, 54.	Touring, 5.	2,000	4	22.50	113	34x4	Left
Peerless, 54.	Cabriolet, 3.	2,300	4	22.50	113	34x4	Left
Peerless, 55.	Roadster, 3.	2,250	6	29.45	121	34x4	Left
Peerless, 55.	Touring, 5.	2,250	6	29.45	121	34x4	Left
Peerless, 55.	Cabriolet, 3.	2,250	6	29.45	121	34x4	Left
Pilot, 75.	Speedster, 2.	2,885	6	48.60	132	37x4	Opt.
Pilot, 75.	Roadster, 2.	2,885	6	48.60	132	37x4	Opt.
Pilot, 75.	Touring, 5.	2,885	6	48.60	132	37x4	Opt.
Pilot, 75.	Touring, 7.	2,885	6	48.60	132	37x4	Opt.
Pratt, 6-50.	Roadster, 2.	2,150	6	22.50	113	36x4	Left
Pratt, 6-50.	Touring, 4.	2,150	6	22.50	113	36x4	Left
Pratt, 6-50.	Touring, 5.	2,150	6	22.50	113	36x4	Left
Pratt, 6-50.	Touring, 7.	2,250	6	22.50	113	36x4	Left
Premier-Weidely, A.	Roadster, 2.	2,700	6	21.57	132	36x4	Left
Premier-Weidely, A.	Touring, 5.	2,700	6	21.57	132	36x4	Left
Premier-Weidely, A.	Touring, 7.	2,750	6	21.57	132	36x4	Left
Pullman, 6-48.	Roadster, 2.	2,500	6	33.75	134	36x4	Left
Pullman, 6-48.	Touring, 5.	2,500	6	33.75	134	36x4	Left
Pullman, 6-48.	Touring, 7.	2,550	6	33.75	134	36x4	Left
Pullman, 6-48.	Cabriolet, 4.	2,800	6	33.75	134	36x4	Left
Singer, 6.	Roadster, 3.	2,350	6	33.40	135	36x4	Left
Singer, 6.	Touring, 5.	2,350	6	33.40	135	36x4	Left
Speedwell, I.	Touring, 7.	2,950	6	40.80	135	37x5	Left
Stearns, 4.	Cabriolet, 2.	2,250	4	22.50	119	34x4	Left
Stearns, 4.	Limousine, 7.	2,850	4	22.50	119	34x4	Left
Stutz, Bearcat.	Roadster, 2.	2,000	4	36.15	120	34x4	Right
Stutz, Roadster.	Roadster, 2.	2,000	4	36.15	120	34x4	Right
Stutz, Bulldog.	Speedster, 4.	2,250	4	36.15	120	34x4	Right
Stutz, Bearcat.	Roadster, 2.	2,125	6	33.40	120	34x4	Right
Stutz, Roadster.	Roadster, 2.	2,125	6	33.40	120	34x4	Right
Stutz, Touring.	Touring, 6.	2,400	6	33.40	120	34x4	Right
Stutz, Touring.	Touring, 6.	2,275	4	36.15	120	34x4	Right
Velie, 12.	Sedan, 5.	2,450	4	34.28	121	37x4	Left
Velie, 14.	Roadster, 2.	2,015	6	29.45	126	37x4	Left
Velie, 14.	Torpedo, 4.	2,015	6	29.45	126	37x4	Left
Velie, 14.	Touring, 5.	2,015	6	29.45	126	37x4	Left
Velie, 14.	Sedan, 5.	2,715	6	29.45	126	37x4	Left
White, 30.	Roadster, 2.	2,700	4	22.50	115	32x4	Left
White, 30.	Touring, 5.	2,700	4	22.50	115	32x4	Left
Willys-Knight.	Roadster, 2.	2,750	4	25.60	120	36x4	Left
Willys-Knight.	Touring, 5.	2,750	4	25.60	120	36x4	Left

*Rear tires only; front a size smaller.

Motor Cars for 1915 Season Costing \$1,250 to \$1,999

THIS class shows the six-cylinder car to be in the majority, this type having a 55.7 per cent following of all the cars here listed, while the four-cylinder shows only 40.2 per cent. The increase in sixes here is due to the entrance of new makers to this price class, among them being Apperson, Chalmers, Cole, Haynes, Jeffery, Kisselkar, Kline, Overland and Auburn.

The buyer of cars in this division is getting a much larger car

this year than he did in 1914, and with the motor dimensions smaller because of the introduction of a large number of sixes. The average wheelbase has been increased from 118.5 to 121.6 inches, while the bore and stroke has changed from 4.07 by 5.18 in 1914 to 3.78 by 5.21 for the 1915 season.

There has been a slight falling off in the number of makers here represented, 1914 showing fifty-four and 1915, fifty.

NAME AND MODEL	Body, Style and Seating Capacity	Price	No. of Cylinders	S. A. E. H. P.	Wheelbase Inches	Tire Size Inches	Location of Steering
Abbott-Detroit, K.	Touring, 5	1,785	4	27.20	116	34x4	Right
Ames, 44	Roadster, 2	1,745	4	27.20	118	36x4	Left
Ames, 45	Touring, 5	1,785	4	27.20	118	36x4	Left
Apperson, 4-40	Touring, 5	1,350	4	25.60	116	34x4	Left
Apperson, 6-48	Touring, 7	1,585	6	29.45	126	34x4	Left
Arbenz	Roadster, 2	1,825	4	27.20	120	36x4	Opt.
Arbenz	Touring, 5	1,885	4	27.20	120	36x4	Opt.
Auburn, 6-40	Roadster, 2	1,550	6	29.45	126	34x4	Left
Auburn, 6-40	Touring, 6	1,550	6	29.45	126	34x4	Left
Briscoe, B.	Coupe, 2	1,250	4	15.64	107	30x3	Opt.
Buick, C-54	Roadster, 2	1,650	6	33.75	130	36x4	Left
Buick, C-55	Touring, 7	1,650	6	33.75	130	35x4	Left
Cadillac, 51	Roadster, 2	1,975	8	31.28	122	36x4	Left
Cadillac, 51	Touring, 5	1,975	8	31.28	122	36x4	Left
Cadillac, 51	Touring, 7	1,975	8	31.28	122	36x4	Left
Cadillac, 51	Salon, 4	1,975	8	31.28	122	36x4	Left
Cartercar, 9	Roadster, 2	1,250	4	19.61	106	33x4	Right
Cartercar, 9	Touring, 5	1,250	4	19.61	106	33x4	Right
Case, 25	Touring, 5	1,350	4	22.50	115	34x4	Left
Case, 35	Touring, 5	1,600	4	29.00	120	35x4	Left
Case, 40	Touring, 5	1,800	4	32.40	124	37x4	Right
Chalmers, 26-B	Touring, 5	1,650	6	29.45	125	34x4	Left
Chalmers, 26-B	Touring, 7	1,725	6	29.45	125	34x4	Left
Chalmers, 26-B	Couplet, 2	1,900	6	29.45	125	34x4	Left
Chandler, 15	Touring, 5	1,595	6	27.30	120	34x4	Left
Chandler, 15	Cabriolet, 3	1,950	6	27.30	120	34x4	Left
Cole, 4-40	Roadster, 2	1,485	4	29.00	118	34x4	Left
Cole, 4-40	Touring, 7	1,485	4	29.00	118	34x4	Left
Cole, 4-40	Coupe, 3	1,885	4	29.00	118	34x4	Left
Cole, 6-50	Roadster, 2	1,865	6	29.45	126	35x4	Left
Cole, 6-50	Touring, 4	1,865	6	29.45	126	35x4	Left
Cole, 6-50	Touring, 7	1,865	6	29.45	126	35x4	Left
Corbitt	Touring, 4	1,600	4	25.60	120	34x4	Right
Corbitt	Touring, 5	1,650	4	25.60	120	34x4	Right
Crawford, 6-35	Roadster, 2	1,850	6	29.45	120	34x4	Left
Crawford, 6-35	Touring, 5	1,850	6	29.45	120	34x4	Left
Crow-Elkhart, E-52	Roadster, 2	1,575	4	29.00	120	34x4	Right
Crow-Elkhart, E-54	Touring, 4	1,625	4	29.00	120	34x4	Right
Crow-Elkhart, E-55	Touring, 5	1,600	4	29.00	120	34x4	Right
Crow-Elkhart, E-56	Touring, 6	1,650	4	29.00	120	34x4	Right
Enger, 6-50	Roadster, 2	1,495	6	29.45	125	34x4	Left
Enger, 6-50	Touring, 7	1,495	6	29.45	125	34x4	Left
Firestone-Columbus, 82-E	Roadster, 2	1,925	4	27.20	116	34x4	Left
Firestone-Columbus, 86-E	Touring, 5	1,925	4	27.20	116	34x4	Left
Great Western, A	Roadster, 2	1,710	4	29.00	117	36x4	Right
Great Western, A	Touring, 4	1,710	4	29.00	117	36x4	Right
Great Western, A	Touring, 5	1,710	4	29.00	117	36x4	Right
Haynes, 32	Touring, 5	1,660	4	29.00	118	34x4	Left
Haynes, 30	Roadster, 2	1,485	6	29.45	121	34x4	Left
Haynes, 30	Touring, 5	1,485	6	29.45	121	34x4	Left
Herff-Brooks, 6-50	Roadster, 2	1,375	6	38.40	124	34x4	Left
Herff-Brooks, 6-50	Touring, 5	1,375	6	38.40	124	34x4	Left
Hudson, 6-40	Roadster, 3	1,550	6	29.45	123	34x4	Left
Hudson, 6-40	Phaeton, 7	1,550	6	29.45	123	34x4	Left
Hudson, 6-40	Cabriolet, 4	1,750	6	29.45	123	34x4	Left
Jackson, Olympic	Roadster, 3	1,375	4	32.40	117	34x4	Left
Jackson, Olympic	Touring, 5	1,375	4	32.40	117	34x4	Left
Jackson, 48	Touring, 5	1,650	6	29.45	125	34x4	Left
Jeffery, 4	Roadster, 2	1,525	4	22.50	116	34x4	Left
Jeffery, 4	Touring, 5	1,450	4	22.50	116	34x4	Left
Jeffery, 4	Convert'l, 2	1,750	4	22.50	116	34x4	Left
Jeffery, Chesterfield	Roadster, 2	1,650	6	21.60	122	34x4	Left
Jeffery, Chesterfield	Touring, 5	1,650	6	21.60	122	34x4	Left
Jeffery, Chesterfield	Convert'l, 2	1,950	6	21.60	122	34x4	Left
King	Cabriolet, 2	1,430	4	24.91	113	33x4	Left
King, D.	Touring, 5	1,430	8	24.16	113	33x4	Left
Kissel, 4-36	Roadster, 2	1,450	4	29.00	121	34x4	Left
Kissel, 4-36	Touring, 5	1,450	4	29.00	121	34x4	Left
Kissel, 4-36	Touring, 5**	1,450	4	29.00	121	34x4	Left
Kissel, 4-36	Touring, 7	1,550	4	29.00	121	34x4	Left
Kissel, 4-36	Sedan, 5	1,800	4	29.00	121	34x4	Left
Kissel, 4-36	Cabriolet, 2	1,750	4	29.00	121	34x4	Left
Kissel, 42	Touring	...	6	31.32	126	35x4	Left
Kline, 6-42	Roadster, 2	1,750	6	29.45	123	34x4	Left
Kline, 6-42	Toy Tour, 4	1,750	6	29.45	123	34x4	Left
Kline, 6-42	Touring, 5	1,750	6	29.45	123	34x4	Left
Kline, 6-42 A	Touring, 7	1,850	6	29.45	127	35x4	Left
Krit, M.	Cabriolet, 3	1,295	4	22.50	108	32x3	Left
Lambert, 68	Roadster, 3	1,565	4	27.20	117	34x3	Right
Lambert, 68	Touring, 5	1,565	4	27.20	117	34x3	Right
Lewis, 6	Roadster, 2	1,600	6	29.45	135	36x4	Left
Lewis, 6	Touring, 6	1,600	6	29.45	135	36x4	Left
Lexington, 6-L	Roadster, 3	1,875	6	29.45	128	34x4	Left
Lexington, 6-L	Touring, 6	1,875	6	29.45	128	34x4	Left
McIntyre, 6-40	Touring, 5	1,275	6	29.45	120	35x4	Right
Meteor, 45	Touring, 5	1,395	6	33.75	126	35x4	Left
Mitchell-Lewis, 4	Roadster, 2	1,250	4	25.60	116	34x4	Left
Mitchell-Lewis, 4	Touring, 5	1,250	4	25.60	116	34x4	Left
Mitchell-Lewis, 4	Touring, 6	1,300	4	25.60	116	34x4	Left
Mitchell-Lewis, 6	Touring, 2	1,585	6	38.40	127	36x4	Left
Mitchell-Lewis, 6	Touring, 5	1,585	6	38.40	127	36x4	Left
Mitchell-Lewis, 6	Touring, 6	1,585	6	38.40	127	36x4	Left
Mitchell-Lewis, Special 6	Roadster, 2	1,895	6	43.50	132	36x4	Left
Mitchell-Lewis, Special 6	Touring, 5	1,895	6	43.50	132	36x4	Left
Mitchell-Lewis, Special 6	Touring, 6	1,995	6	43.50	132	36x4	Left
Monarch, 6	Touring, 5	1,250	6	29.45	125	33x4	Left
Monarch, 6	Touring, 7	1,275	6	29.45	125	33x4	Left
Moon, 4-38	Roadster, 3	1,350	4	22.50	122	34x4	Left
Moon, 4-38	Touring, 5	1,350	4	22.50	122	34x4	Left
Moon, 6-40	Roadster, 3	1,575	6	29.45	122	34x4	Left
Moon, 6-40	Touring, 6	1,575	6	29.45	122	34x4	Left
Norwalk, F.	Roadster, 2	1,875	6	29.45	131	37x4	Left
Norwalk, F.	Touring, 4	1,875	6	29.45	131	37x4	Left
Norwalk, F.	Touring, 6	1,875	6	29.45	131	37x4	Left
Oakland, 49	Touring, 7	1,685	6	29.45	123	35x4	Left
Oldsmobile, 42	Roadster, 2	1,285	4	19.61	112	33x4	Left
Oldsmobile, 42	Touring, 5	1,285	4	19.61	112	33x4	Left
Overland, 80	Coupe, 4	1,600	4	27.20	114	35x4	Left
Overland, 82	Touring, 7	1,475	6	29.45	125	35x4	Left
Paige, 6	Roadster, 3	1,395	6	29.45	124	34x4	Left
Paige, 6	Touring, 7	1,395	6	29.45	124	34x4	Left
Paterson, 6-48	Touring, 5	1,495	6	29.45	124	34x4	Left
Pilot, 55	Roadster, 2	1,885	6	29.45	126	34x4	Left
Pilot, 55	Touring, 5	1,885	6	29.45	126	34x4	Left
Pilot, 55	Touring, 7	1,985	6	29.45	126	34x4	Left
Pratt, 4-40	Roadster, 2	1,850	4	27.20	122	34x4	Left
Pratt, 4-40	Touring, 4	1,850	4	27.20	122	34x4	Left
Pratt, 4-40	Touring, 5	1,850	4	27.20	122	34x4	Left
Spaulding, H.	Touring, 5	1,680	4	29.00	120	36x4	Left
Spaulding, H.	Sleeper, 5	1,730	4	29.00	120	36x4	Left
Stearns, 4	Touring, 5	1,750	4	22.50	119	34x4	Left
Studebaker, 6	Touring, 5	1,385	6	29.45	121	34x4	Left
Studebaker, 6	Touring, 7	1,450	6	29.45	121	34x4	Left
Stutz, H.C.S.	Roadster, 2	1,475	4	36.15	108	32x4	Right
Velie, 4-45	Roadster, 2	1,750	4	34.28	121	37x4	Left
Velie, 4-45	Touring, 4	1,750	4	34.28	121	37x4	Left
Velie, 4-45	Touring, 5	1,750	4	34.28	121	37x4	Left
Velie, Biltwel	Roadster, 2	1,595	6	29.45	124	34x4	Left
Velie, Biltwel	Touring, 5	1,595	6	29.45	124	34x4	Left
Velie, Biltwel	Touring, 6	1,645	6	29.45	124	34x4	Left
Velie, Biltwel	Convert'l, 2	1,850	6	29.45	124	34x4	Left
Westcott, U.	Roadster, 2	...	6	29.45	125	35x4	Left
Westcott, U.	Touring, 6	...	6	29.45	125	35x4	Left

*Rear tires only; front a size smaller. **2-door design.

Motor Cars for 1915 Season Costing Less than \$1,250

AN enlarged field with new names and new cars is seen in this, the low-price classification. Argo, the lowest-priced four-cylinder car shown, which sells for \$285, is a newcomer. Ater, Bauer, Cycleplane Vixen and Peter Pan are a few others. A number of new inclosed cars are shown in this class, among them being the Scripps-Booth coupe and cabriolet, the Twombly town car, the Ford sedan and coupelet and the Trumbull coupe. This is the first time cars selling below \$1,250 have had such a large closed-car representation.

Equipment, while not mentioned in the tables, has been improved to a great extent. Electric cranking and lighting systems are given as stock on 61 per cent of the cars in this class, whereas in 1914 not one car in this division was so equipped. The Remington car is featured with a mechanical gearshift, another equipment innovation for cars of this price.

The general run of prices is considerably lower this year than

it was during 1914, the average for vehicles in this division having dropped from \$950 to \$855, while at the same time the average wheelbase for these small vehicles has increased slightly.

Fifteen more makers, bringing the total to 50, are seen in the lowest-price class. This increase has been due mainly to the popularity of the small car or successor of the cyclecar. These small vehicles also have had some influence in bringing down the average motor size, price, etc.

The average car of this class has a four-cylinder, block cast, L-head motor of 3.52 by 4.28 and is thermo-syphon cooled. The latter method is used on 75 per cent of the cars in this class. Another characteristic is the enormous rise in the use of single ignition on the low-priced vehicles. In 1914 55 per cent used this type of ignition and this season sees more than 86 per cent so equipped. Battery ignition by means of a combination timer and distributor and a coil is used to a large extent in the small cars.

NAME AND MODEL	Body, Style and Seating Capacity	Price	No. of Cylinders	S. A. E. H. P.	Wheelbase Inches	Tire Size Inches	Location of Steering
Allen, 34	Roadster, 2	895	4	21.08	110	32x3 1/2	Left
Allen, 34	Touring, 5	895	4	21.08	110	32x3 1/2	Left
Alter, 4-27	Touring, 5	685	4	22.50	106	30x3 1/2	Left
Argo	Roadster, 2	295	4	8.52	90	28x2 1/2	Left
Auburn, 4-36	Roadster, 2	1,075	4	22.50	114	32x4	Left
Auburn, 4-36	Touring, 5	1,075	4	22.50	114	32x4	Left
Bauer, 30	Roadster, 2	875	4	22.50	110	34x3 1/2	Left
Bauer, 30	Touring, 5	1,000	4	22.50	110	34x3 1/2	Left
Briscoe	Roadster, 3	785	4	15.64	107	30x3 1/2	Opt.
Briscoe	Touring, 5	785	4	15.64	107	30x3 1/2	Opt.
Buick, C-24	Roadster, 2	900	4	22.50	106	32x3 1/2	Left
Buick, C-25	Touring, 5	950	4	22.50	106	32x3 1/2	Left
Buick, C-36	Roadster, 2	1,185	4	22.50	112	34x4	Left
Buick, C-37	Touring, 5	1,235	4	22.50	112	34x4	Left
Chevrolet, Baby Grand	Touring, 5	985	4	21.74	106	32x3 1/2	Left
Chevrolet, Royal Mail	Roadster, 2	860	4	21.74	106	32x3 1/2	Left
Crow-Elkhart, E-42	Roadster, 2	1,150	4	25.60	114	33x4	Right
Crow-Elkhart, E-45	Touring, 5	1,185	4	25.60	114	33x4	Right
Cycleplane-Tourist	Roadster, 2	350	4	10.00	108	28x3	Left
Cycleplane-Tourist	Touring, 3	400	4	10.00	103	28x3	Left
Cycleplane-Traveler	Tandem, 2	250	2	9.11	96	28x2 1/2	Centre
Davis, 38-A	Roadster, 2	1,235	4	22.50	112	34x4	Left
Davis, 38-B	Touring, 5	1,235	4	22.50	112	34x4	Left
Detroit, C	Touring, 5	985	4	19.61	112	32x3 1/2	Left
Dile, A	Roadster, 2	485	4	11.23	96	28x3	Left
Dodge	Touring, 5	785	4	24.22	110	32x3 1/2	Left
Empire, 31-40	Roadster, 2	875	4	22.50	108	32x3 1/2	Left
Empire, 31-40	Roadster, 2	975	4	22.50	108	32x3 1/2	Left
Empire, 31-40	Touring, 5	850	4	22.50	103	32x3 1/2	Left
Empire, 31-40	Touring, 5	975	4	22.50	108	32x3 1/2	Left
Ford, T	Roadster, 2	440	4	22.50	100	30x3 1/2	Left
Ford, T	Touring, 5	490	4	22.50	100	30x3 1/2	Left
Ford, T	Coupelet, 2	750	4	22.50	100	30x3 1/2	Left
Ford, T	Town Car, 6	690	4	22.50	100	30x3 1/2	Left
Ford, T	Sedan, 5	975	4	22.50	100	30x3 1/2	Left
Glide, 30	Roadster, 2	1,195	4	19.61	114	32x4	Left
Glide, 30	Touring, 5	1,195	4	19.61	114	32x4	Left
Grant, M	Roadster, 2	505	4	12.08	90	28x3	Left
Grant, T	Roadster, 2	750	6	20.00	106	30x3 1/2	Left
Grant, T	Touring, 5	750	6	20.00	106	30x3 1/2	Left
Herff-Brooks, 4-40	Roadster, 2	1,100	4	32.40	118	34x4	Left
Herff-Brooks, 4-40	Touring, 5	1,100	4	32.40	118	34x4	Left
Herreshoff, 4-16	Roadster, 2	500	4	12.08	94	28x3	Left
Hupmobile, H	Roadster, 2	.....	4	16.92	106	33x4	Right
Hupmobile, H	Touring, 5	.....	4	16.92	106	33x4	Right
Hupmobile, K	Roadster, 2	1,200	4	18.21	119	34x4	Left
Hupmobile, K	Touring, 5	1,200	4	18.21	119	34x4	Left
Imperial, 64	Touring, 5	1,035	4	22.50	115	32x3 1/2	Left
Inter-State, 71	Touring, 5	1,000	4	19.61	110	33x4	Left
Kearns-Kar	Roadster, 2	450	4	13.37	100	28x3	Opt.
Kearns-Kar	Speedster, 2	450	4	13.37	100	28x3	Opt.
King	Roadster, 2	1,165	4	24.91	113	33x4	Left
King	Touring, 5	1,165	4	24.91	113	33x4	Left
Krit, O	Roadster, 2	850	4	22.50	108	32x3 1/2	Left
Krit, O	Touring, 5	850	4	22.50	108	32x3 1/2	Left
Krit, M	Roadster, 3	995	4	22.50	108	32x3 1/2	Left
Krit, M	Touring, 5	995	4	22.50	108	32x3 1/2	Left
Lambert, 48-C	Touring, 5	1,200	4	22.50	112	32x3 1/2	Left
Maxwell, 25	Roadster, 2	670	4	21.09	102	30x3 1/2	Left
Maxwell, 25	Touring, 5	695	4	21.09	102	30x3 1/2	Left
McIntyre, 25	Touring, 5	695	4	22.50	106	30x3	Left
Meteor, 42	Touring, 5	1,075	4	25.60	114	34x4	Left
Metz, 22	Roadster, 2	495	4	22.50	96	30x3	Left
Oakland, 37	Roadster, 2	1,150	4	19.61	112	33x4	Left
Oakland, 37	Touring, 5	1,200	4	19.61	112	33x4	Left
Overland, 80	Roadster, 2	1,050	4	27.20	114	34x4	Left
Overland, 80	Touring, 5	1,075	4	27.20	114	34x4	Left
Overland, 81	Roadster, 2	795	4	25.60	106	33x4	Left
Overland, 81	Touring, 5	850	4	25.60	106	33x4	Left
Partin-Palmer, 20	Roadster, 2	495	4	15.64	96	28x3	Left
Partin-Palmer, 33	Touring, 6	1,075	4	22.50	115	33x4	Left
Paterson, 4-32	Touring, 5	1,095	4	19.61	112	33x4	Left
Peter Pan	Touring, 4	635	4	12.08	110	29x3 1/2	Left
Peter Pan	Roadster, 2	650	4	12.08	110	29x3 1/2	Left
Pullman, Junior	Roadster, 3	740	4	25.60	110	30x3 1/2	Left
Pullman, Junior	Touring, 5	740	4	25.60	110	30x3 1/2	Left
Rayfield, 20	Roadster, 2	395	4	12.08	96	28x3	Left
R.C.H., K	Touring, 5	900	4	16.92	110	32x3 1/2	Opt.
Regal, D	Roadster, 2	1,035	4	22.50	112	32x3 1/2	Opt.
Regal, D	Touring, 5	1,085	4	22.50	112	32x3 1/2	Opt.
Remington	Roadster, 2	595	4	12.08	106	30x3	Left
Remington	Touring, 5	695	4	12.08	105	30x3 1/2	Left
Saxon	Roadster, 2	395	4	11.23	96	28x3	Left
Saxon	Touring, 5	.....	6	.....	112	.....	Left
Scripps-Booth, C	Roadster, 3	775	4	13.37	110	30x3 1/2	Left
Scripps-Booth, C	Cabriolet, 3	.....	4	13.37	110	30x3 1/2	Left
Scripps-Booth, C	Coupe, 3	.....	4	13.37	110	30x3 1/2	Left
Sphinx, 8-15	Touring, 5	695	4	18.21	112	30x3 1/2	Left
Studebaker, 4-SD	Roadster, 3	985	4	19.61	108	33x4	Left
Studebaker, 4-SD	Touring, 5	985	4	19.61	108	33x4	Left
Trumbull, 15-A	Roadster, 2	395	4	.....	80	28x3	Opt.
Trumbull, 15-A	Coupe, 2	600	4	.....	80	28x3	Opt.
Twombly	Roadster, 2	600	4	15.64	100	30x3 1/2	Left
Twombly	Town Car, 3	750	4	15.64	100	30x3 1/2	Left
Vixen	Touring, 3	.....	4	12.08	106	28x3	Right
Vulcan, 35	Touring, 5	975	4	19.60	120	32x3 1/2	Left
Vulcan, 35	Roadster, 2	975	4	19.60	120	32x3 1/2	Left
Westcott, O	Speedster, 2	1,150	4	19.61	113	33x4	Left
Westcott, O	Roadster, 2	1,150	4	19.61	113	33x4	Left
Westcott, O	Touring, 5	1,150	4	19.61	113	33x4	Left

*Rear tires only; front a size smaller.

Motoring World Awaits Opening of New York Show

More Than 350 Exhibitors Booked for the Palace

NEW YORK, Dec. 28—Next Saturday at 2 o'clock the fifteenth annual motor show will open in the Grand Central Palace in this city, the lower four floors of the skyscraper being given over to the 338 exhibits of cars, accessories and motorcycles. For 1 week the exhibit will continue, opening each day at 10 a. m. and closing at 10:30 p. m.

In staging this motor exhibition the National Automobile Chamber of Commerce anticipates the largest motor car show this city ever has seen, there being approximately 50,000 additional square feet of exhibit space as compared with a year ago, making the grand total of 150,000 square feet. Occupying this space are approximately seventy-six makers of gasoline cars (there may be two or three more by opening hour); five makes of electrics, thirteen motorcycle makers and 238 makers of accessories and component parts for cars. This total will without doubt be materially increased, many accessory concerns coming in at the eleventh hour so that the total of 352 exhibitors at the show a year ago will be equalled if not eclipsed.

The car exhibits will be staged on the first two floors of the palace, the five makers of electrics being suitably grouped on the second floor. Last year 492 different cars and chassis were displayed and it is expected that this figure will be slightly exceeded. Perhaps more than 500 vehicles will be on display at once. With the first allotment of exhibit space some of the latecomers in the car field were given space on the third floor, but a few cancellations of space have made it possible to group all of the car exhibits on the first two floors, leaving floors three and four exclusively for accessory makers, the majority of this accessory space having been taken by members of the Motor and Accessory Manufacturers.

Seventy-six Makes of Cars

Of the seventy-six makes of cars exhibiting sixty are members of the N. A. C. C. and sixteen are outsiders, these non-members todate including Crawford, Davis, Durant, Enger, Grant, Herff-Brooks, Lexington-Howard, L. P. C., Owen, Paterson, Pilot, Remington, Scripps-Booth, Twombly, Trumbull and Gadabout. Not all of the members of the N. A. C. C. are exhibiting, several familiar faces of past years being missing, among these being noted Abbott, Austin, Great Western, Lozier, Marion, Pope-Hartford, Pullman, S. G. V., Speedwell and Staver, some of which have ceased manufacturing operations during the year, and others which are not exhibiting.

This show will be the brightest of any yet staged in the Grand Central Palace, more lavish decorations being used on all floors. Heretofore decorations on the

scale of shows held in Madison Square Garden or the Coliseum, Chicago, have not been used in the palace, it being a new building and considered sufficiently ornate to make a desirable setting for cars and accessories without additional draperies excepting on a small scale.

This show will be a Persian garden effect, with wall panels largely covered with mirrors and pillars draped with hangings. The color scheme is white, gold and crimson. On the first two floors the names of cars will be shown by small electric signs in place of the painted sign of former years. It is expected that the conventional painted sign will be used throughout the accessory floors.

Program of Show Week

The social program of show week gives promise of being the gayest for many years, the various associations, makers and dealers vying with each other in using the week to the best advantage to stimulate the growing spirit of optimism that has been so gladly received in other cities. For the first time since the famous Selden patent decision was handed down the national organization will hold a banquet, this being the first to be held by the National Automobile Chamber of Commerce. It will be held Tuesday evening at the Waldorf. Already the available space for 325 members of the chamber and guests has been taken up, this in spite of the limit of four places for each member of the chamber. Instead of a long program of speeches there will be but one set address with the remainder of the program given up to vaudeville sketches and a moving-picture show of cartoons on the leading men of the industry.

Following its annual custom for years the Motor and Accessory Manufacturers will hold its annual banquet at the same hotel on Wednesday evening. Besides these two social headliners many makers will hold dealers' luncheons and dinners during the week, a few of those definitely decided on to date being Overland, Franklin, Hupp, Paige-Detroit, Saxon and A. J. Picard on Thursday night; Chalmers Monday, Studebaker Tuesday, Briggs-Detroit Wednesday and Chandler Saturday. Instead of its formal dinner of previous years the Society of Automobile Engineers will have two informal night dinners on Wednesday and Thursday.

A fairly full program of business meetings will be held during the show week. The annual mid-winter session of the S. A. E. will be the largest embracing 3 days, Tuesday, Wednesday and Thursday, the sessions being held in the Auditorium of the Engineering Societies Building, 29 West Thirty-Ninth street. On Tuesday the program is confined to the standard com-


mittee work and will be held in the society's headquarters, 1790 Broadway. The National Automobile Chamber of Commerce will hold a directors' meeting on Thursday and its patents committee will meet on Tuesday. The Motor and Accessory Manufacturers will hold a series of meetings, including finance committee, executive committee and board of directors on Wednesday and a board of directors' meeting on Thursday. The American Automobile Association will have a meeting of its executive board at headquarters, 437 Fifth avenue on Saturday.

As at all previous New York shows visiting dealers will be particularly taken care of. The show management has invited more than 15,000 and it is expected that more than 4,000 will attend, this figure being reached a year ago. Each dealer has been sent an invitation card and it only will be necessary for him to register at the show to receive every courtesy by way of admission, etc. Generally dealers only east of the Cleveland-Atlanta line attend the New York show, the number not being so great as that attending the Chicago exhibition. To dealers not included on the invitation list it will only be necessary for them to present adequate credentials from the concerns they represent to receive the courtesies of the show.

Caring for Truck Makers

A new feature of the show to open Saturday is that courtesy to be extended to motor truck makers who are members of the N. A. C. C. and also to non-members. A large area of floor space has been set apart on the third floor for the use of truck makers. This space will be provided with desks, telephones, etc., and truck makers can establish their headquarters here, can meet dealers and prospects and transact general business. This new move on the part of the chamber would tend to show that there has been a slight change of heart with many truck makers as compared with 2 years ago when members of the chamber voted against a truck show. The major complaint from truck makers is that they have not had a chance of getting in touch with dealers at the show, and this new move should be valuable in this regard. The spaces will be named the commercial vehicle division and will be under the direction of an N. A. C. C. official and in addition each truck maker can have his representatives in the space as much of the time as desired.

Manager S. A. Miles, of the show, has made some interesting calculations as to the value of shows and estimates that \$1,000,000 will be spent in New York by those attending the show. According to his estimates more than 20,000 out-of-town visitors will attend.



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Weighing Motor Car Efficiency

THE days are rapidly passing, perhaps gone, when we calculate motor car efficiency by the scale of size. Today because a four-cylinder motor has cylinders 4 by 5 inches we do not think of it as being more powerful than another motor with cylinders 3.5 by 5, because we have passed the period when mere size is a definite criterion of value or output. The motor industry is experiencing a change not different from that which has exerted its influence in many other industries, namely, the transition between bulk strength, if the term may be used, and efficiency which is the outcome of a better application of first principles of engineering in motor cars.

YEARS ago the giant was the victor on the battlefield, but today with the aid of science the pygmy behind a rapid-fire gun or the average man with his magazine rifle in the trenches could put perhaps a hundred giants to rout. Let us look for a few evidences of this same principle in the making of motor cars.

OUR analysis of the average motor car for 1915 shows many changes that have been more or less conspicuously at work for 4 or 5 years. These changes on the surface would lead us to believe that our cars of today are less powerful, that the completed machines are less speedy, and that naturally our prices are lower. Applying this thought of higher efficiency we find that small motors do not necessarily mean less horsepower, and if in some cases the generated horsepower is less, the net final result is not a car of lower speed or less power but yet a car that has been improved throughout so that with the smaller motor it really is a superior performing machine. American builders have made very considerable progress in this respect during the last 12 months, but the thin edge of the wedge has only been entered.

THE car of 1915 is the cheapest car for value received that ever has been placed on the American market, thanks to increased production with many companies and also thanks to engineers who in designing the different car parts have at last succeeded in keeping the question of cost of manufacture in mind, so that while providing a vehicle cheaper to manufacture they have not allowed any deterioration in quality to creep in. The standardization work of the Society of Automobile Engineers has greatly assisted in this work, and the result of this standardization program would have made itself more generally experienced before this if many of our engineers had not been so slow in adopting the new standards. Unfortunately we still have with us engineers who are not practical motor car men, who, if they had to spend one whole year driving a car and keeping it in repair themselves or paying all of the repair bills, would alter some of the constructions very quickly.

ONE example of reduced cost of manufacture is the matter of single ignition, which has made material gains during the past year. It is cheaper to furnish one set of spark plugs than

two, and where comes the need for two sets if one system is as efficient as it should be. Nearly 10 years ago one maker exhibited a car at the New York show with two four-cylinder motors mounted under the hood. There they were side by side, two complete motors with two carbureters, two water pumps, in short, everything in duplicate. When asked the reason for such an astounding design the ready answer came "one can be used in case the other gives trouble and will not work." Fitting complete double systems of ignition today seems nearly on a par with two motors 10 years ago. Ignition specialties have been perfected, spark plugs have been perfected, so that today it is not uncommon for a set of spark plugs to last 3 or 4 years without giving scarcely a bit of trouble; in fact, those owners who tinker too much with their cars are generally assured of more troubles than those who leave them alone, but see to it that some intelligent attention is given the car periodically.

CAR owners will watch with peculiar interest the development of the eight-cylinder motor during 1915. That the eight is bound to increase in use is now assured. One leading motor maker already has announced his stock eight-cylinder type which he will sell to the trade and two others have their designs completed and have had them under test for some time. By the end of March or early in April it will not be surprising to hear of many announcements of eight-cylinder cars for 1916, in fact, it will be surprising if some late 1915 announcements with eight-cylinder motors are not forthcoming before the opening of spring.

THE eight-cylinder movement has gained very rapid headway because of the few strong reasons advanced against the eight, in fact, the surprise being that not a few makers had not taken the eight up at an earlier date. The shorter wheel-base as compared with a six is an attraction in these days when the use of a car in cities is becoming more and more dependent on the ease with which it can be operated in the crowded streets.

IT is surprising that the sedan and coupe body types have not progressed faster than they have. They are the most sensible body design for winter use. The question of price has worked against both of them in the field of medium prices, but in spite of price, the sedan is bound to come into its own as is the coupe. These are essentially family cars, vehicles for the owner-driver, and must not be looked upon as encroachments of the limousine field. The present curtailment of living expenses has switched not a few from limousines to sedans this fall, and if the sedan body could be listed at much more reasonable rates, the man owning the average car would soon become a heavy buyer. Sedan bodies will have to be built on a production basis, and it may be that the time is not far distant when body measurements will be standardized so that owners of perhaps a dozen different makes of cars can secure closed types which will be interchangeable with their open bodies. Making closed types on such a basis would practically insure the development of such a market.

Toll Roads for Motor Car Use Proposed for Texas

System of Concrete Highways Contemplated

AUSTIN, Texas, Dec. 27—There promises to be considerable progress made in the construction of motor car toll roads in Texas during the coming year. The last legislature passed a law which authorizes the creation of corporations for the purpose of building and operating highways of this character and a few companies already have been organized and are working on plans for the establishment of such enterprises.

One of these is the Texas Concrete Motor Highway Co., which has its main office in Austin. It is stated by Worth S. Ray, who is one of the promoters of this project, that good progress is being made in the plans for the building of a system of concrete highways, to connect points in north and south Texas. It is estimated that the cost of constructing such a road will be about \$20,000 per mile. This estimate is based on a roadway width of 18 feet and a cost of concrete of \$1.25 per square yard for the paving. Figuring on this basis the cost of concrete paving would be \$13,200 per mile. This would leave \$6,800 per mile for various other purposes connected with the project, such as purchase of right of way, grading, draining, bridging and fencing. It is claimed that the maintenance of a road of this kind would cost very little, as the wear and tear from rubber-tired vehicles is nominal indeed.

The mildness of the Texas climate also is a big factor in the permanency of concrete roads. But for such expenses as would be necessary, such as salaries of the tollkeepers, keeping the fences and bridges in repair, the sum of \$200 per mile is considered a liberal estimate. In order to pay 6 per cent interest on the investment and meet the other expenses the earnings from tolls should be at least \$1,500 per mile, per annum, it is claimed by the promoters.

The toll rate that is to be charged for motor cars is 1 cent per mile, which it is said would mean a saving of at least 2 cents per mile in gasoline, tires and general wear and tear on each machine. A higher rate per mile will be charged for motor trucks. At the rate of 1 cent per mile there would have to pass over the highway an average of 150,000 cars per annum to yield a revenue of \$1,500 per mile. This would be at the rate of 412 cars per day.

No figures are available as to the average traffic of motor cars over the principal highways of the state, but it is known that in the vicinity of the larger cities the number that pass a given point on any of the principal roads is very large, probably up in the thousands. It is stated that if the proposed minimum rate of 1 cent per mile is considered too low

after further investigation it can be increased to as much as 2 cents without having a diminishing effect on the traffic.

SALON HAS TEN EXHIBITORS

New York, Dec. 28—France, England, Italy and the United States are represented by the ten exhibitors who have already taken space for the importers' salon to be held at the Astor hotel, January 2 to 9. The exhibitors who have already taken space are the representatives in this country of de Dion-Bouton, Fiat, Isotta-Fraschini, Lancia, Renault, Rolls-Royce, Sim-

plex, Sheffield-Simplex, Holbrook Co. and Brewster & Co.

The importers claim that this show will be fully as comprehensive as its predecessors, despite the war, and that the latest models will be displayed.

BRUSKE TO JOIN MAXWELL

Detroit, Mich., Dec. 26—Paul Hale Bruske, who has been with the Studebaker Corp. for several years and who was manager of the publicity department, has resigned to join the Maxwell Motor Co., beginning January 1, 1915.

See America First — • • • See America Now



EDITOR'S NOTE—This is the seventh of a series of illustrations and thumb-nail sketches of the scenic and historic wonders of America to be run off in Motor Age with the idea of calling the attention of motorists to the picturesque points of interest in their own country.

No. 7—ST. AUGUSTINE'S FAMOUS OLD FORT

For over 3 centuries St. Augustine, Fla., was a military stronghold and the seat of government for all of Florida. The first fort, built of logs on the site of the present one, was destroyed by Sir Francis Drake in his attack upon the town in 1586 to avenge the death of one of his men at the hands of the Spanish garrison. In the meantime, coquina—a shell formation—had been discovered on Anastasia island and the construction of the present fort of that material was begun in 1592 and finished at great expense in 1756. It was then called San Marco castle. Although attacked many times by the Indians and fiercely bombarded by the English under Oglethorpe in 1740, the old castle never has been captured. The castle also was used as a prison for captive Indians. Osceola, the Seminole chieftain, was imprisoned here with the famous "Wild Cat," who was one of the only two prisoners ever known to escape. It was renamed Fort Marion in 1821, in honor of General Marion, who earned the title of "Swamp Fox" during the war of the revolution, and was occupied by union soldiers during the late civil war.

Barney Oldfield to Build Speedway

Los Angeles to Have 1 1/4-Mile Track

LOS ANGELES, Cal., Dec. 24—Plans for another motor speedway were announced here this afternoon. Barney Oldfield is to be president of the corporation which will build a 1 1/4-mile board course. Oldfield claims he has put his own money into the project and that the stock has been so closely guarded that there is none for sale and the entire corporation is in the hands of six men.

The location is to be announced within the next few days, according to Oldfield. Jack Prince will superintend the construction of the track.

The plans call for two 1/4-mile straight-aways with triple radius turns. The grandstand, which is to be completed for the opening meet, is to seat 50,000, and with the infield space, 100,000 can easily be accommodated.

Oldfield is to have the management of the races and it is his intention to have the first race after the San Francisco events in February.

With a guaranteed purse amounting to \$10,000, the drivers are to share in the proceeds of each and every race held on the Los Angeles speedway and the course is being built for the purpose of bringing the winter racing headquarters of the world to Los Angeles.

The track is to be on a 5-cent car line within a short distance from the center of the city. The motordrome and other local courses have failed largely on account of the car service, it is claimed. Construction work is to start within the next 10 days and but 40 working days are to be consumed in the construction of the course.

Burman Enters Cactus Derby

Burman is the first driver entered for the 1915 cactus derby. Al. G. Faulkner, of this city, a veteran pilot of the Los Angeles-to-Phoenix road race and Southern distributor for the Fiat, McFarlan and Jeffery lines, has placed a certified check with the motor editor of a Los Angeles newspaper, which calls for the entry of a Fiat car, and Faulkner has nominated Bob Burman to drive his entry.

While wintering here, Burman has done considerable touring over the Southern California roads and announced that he would like to drive in a Phoenix road race. Faulkner offered to furnish the car and enter it in the next desert classic if Burman would drive. The speed king agreed and the first entry for the next desert race is assured.

There will be a cactus derby run in 1915. The Phoenix road race or its equivalent will be run. A number of prominent Southern California motor racing enthusiasts have taken hold of the race and already several hundred dollars have been subscribed. It is the intention of the

desert race boosters to raise a \$15,000 purse.

With 100 men in Los Angeles guaranteeing \$100 each, Phoenix donating \$2,000 to the cause and San Diego \$2,000, it should be an easy matter to get \$1,000 along the route. Yuma gives \$500 annually and the Imperial valley towns have always contributed.

May Use Northern Route

If the race is run over the northern route again, by way of Needles, Kingman and Prescott, it is possible that Phoenix will not contribute as much as if the race was over the southern route. The northern route covers a leg of the Santa Fe-Grand Canyon-Needles National highway, the National Old Trails route. The southern route through San Diego and the Imperial valley is over the Ocean-to-Ocean highway, which leads directly through Phoenix. It is only natural that the Phoenix boosters should be partial to the southern route, but it has been assured that enough money will be raised along the Needles route if the desert classic is sent that way next fall, to offset the shortage of Phoenix.

With Arizona going dry, there has been

Coming Motor Events

SHOWS AND CONVENTIONS

January 1-6—Show, Louisville, Ky.
January 2-9—New York show.
January 7-9—Show, Pasadena, Cal.
January 8-14—Show, Milwaukee, Wis.
January 9-16—Philadelphia show.
January 11-16—Show, Buffalo, N. Y.
January 16-23—Show, Detroit, Mich.
January 16-23—Show, Cleveland, O.
January 16-23—Show, Detroit, Mich.
January 18-23—Show, Rochester, N. Y.
January 20-23—Show, Lancaster, Pa.
January 23-30—Chicago show.
January 23-30—Montreal show.
January 25-30—Show, Fall River, Mass.
January 26-30—Show, Tiffin, O.
January 30-February 6—Minneapolis show.
January 30-February 6—Show, Columbus, O.
February 2-6—Show, Kalamazoo, Mich.
February 15-20—Show, Omaha, Neb.
February 15-20—Show, Grand Rapids, Mich.
February 8-15—Show, Kansas City, Mo.
February 15-20—Show, Tacoma, Wash.
February 23-27—Show, Ft. Dodge, Ia.
February 23-27—Show, Syracuse, N. Y.
February—Show, Portland, Ore.
February—Show, Toledo, O.
February—Show, Hartford, Conn.
March 6-13—Show, Boston, Mass.
March 8-13—Show, Des Moines, Ia.

CONTESTS

December 30-January 2—El Paso-San Diego road race.
January 9—Point Loma road race, San Diego, Cal.
*February 22—Vanderbilt cup race, San Francisco, Cal.
*February 27—Grand prize road race, San Francisco, Cal.
March 17—Road race—Venice, Cal.
*May 29—500-mile speedway race, Indianapolis, Ind.

*Sanctioned by A. A. A.

much comment on the possibility of the annual Phoenix road race being dropped. There is a certain amount of truth in the statement that the sportsmen will find it difficult to raise the purse money along the route, but if the race is not run to Phoenix it will be routed to some other Arizona or Nevada point.

There has been a movement started to pull the race to Reno next fall and many of the Southern California motor race boosters are anxious to see the contest run over an entirely new route next fall. However, there is to be a desert race and it will be the biggest event of its kind.

When Barney Oldfield won the cactus derby last month, the eastern drivers realized for the first time that it was a big-league event. For 6 years, rank amateurs had gone into the Phoenix grind for the glory alone and the winner had gone entirely unnoticed, but when Oldfield captured first honors in the Stutz racer, the eyes of the racing world were turned toward the desert classic.

Arthur Klein, owner and driver of the King racer which appeared at Indianapolis last May and later at Tacoma and Corona, announced today that he would have an eight-cylinder King racer at Indianapolis for the next 500-mile race.

Klein is entered at San Diego and San Francisco and has orally agreed to enter the Venice road race March 17. After the Venice event, the driver is to go east to the King factory to take his new racer for its first tryouts. The eight-cylinder King racer is to weigh 1,750 pounds and have a piston displacement of 270 inches, according to Klein.

Charles E. Erbstein, of Chicago, arrived in Los Angeles this afternoon from Texas, where he has been engaged in a legal fight, and immediately announced that he would enter his Marmon racer in the San Diego exposition road race and the San Francisco speed events in February. Gaston Morris is to pilot his entry.

At an open meeting of the Santa Monica city council and citizens, held, it was decided by popular vote that there would be no road race held on the famous Santa Monica course in 1915 and the citizens pledged their support and coöperation to the Venice road race committee. The Venice event is scheduled for March 17 and the Santa Monica race enthusiasts claim that they wish to help Venice make it the greatest motor classic ever staged on the Pacific coast. The sum of \$8,000 already has been subscribed to the purse.

Ed. Rickenbacher returned to this city last night after a visit to New York and other eastern cities on business for the Peugeot Import Co., which he is representing here. Rickenbacher has entered two Peugeot cars for the San Diego exposition road race January 9 and upon his return, announced that Fred McCarthy who rode as his mechanic in the Corona event would pilot the second Peugeot entered under his name at San Diego. With the entry

of Bob Burman's car, there will be three French Peugeots on the course at San Diego.

Two Chevrolet racers are to be entered in the Vanderbilt cup and grand prix races to be held at San Francisco in February and also in the Venice road race, scheduled for March 17. This information was given out by Cliff Durant, wholesale manager for the Chevrolet company, on the Pacific coast, before leaving for the factory at Flint, Mich., this afternoon.

After visiting the factory, taking in the New York and Chicago shows, young Durant is to return to the coast with the two racers. Jack Le Cain is to drive one of the cars at San Francisco and Durant is to pilot the other himself. Durant drove in the 1914 Phoenix road race and captured fourth place.

PIEL MOTION DENIED

New York, Dec. 30—Special telegram—Judge Hand has denied the motion for a preliminary injunction made by Gottfried Piel and the G. Piel Co. in the suit against the Stewart-Warner Speedometer Corp. of New York and the Stewart-Warner Speedometer Corp. of Virginia, involving alleged infringement of the Long hand horn patent 1,900,080.

RITZ SUES DRIGGS-SEABURY

New York, Dec. 28—The Ritz Cycle Car Co., of this city, has filed suit for \$50,000 damages against the Driggs-Seabury Ordnance Corp., Sharon, Pa., alleging failure to carry out its part in a contract calling for the manufacture and delivery of 500 small cars, to be known as the Ritz, at the rate of 100 cars per month during June, July, August, September and October of this year.

Briggs Announces An Eight-Cylinder New Detroit to List at \$1,295

DETROIT, Mich., Dec. 30—Special telegram—The Briggs-Detroit Co., of this city, today has made known the details of its eight-cylinder car which is to be seen at the New York and Chicago shows. The car, in touring body form, is to sell for \$1,295.

The motor adheres closely to the usual form of construction with the two blocks of four cylinders arranged at 90 degrees to each other on the aluminum crankcase. The bore and stroke are $2\frac{3}{4}$ by $4\frac{1}{2}$ inches, giving a horsepower of 34 at 1,800 revolutions per minute, it is stated.

The camshaft is placed vertically above the two-bearing crankshaft, the former operating two sets of valves through the use of pivoted arms carrying rollers against which the cams operate. Both crankshaft and camshaft are the same in form as a four-cylinder engine would use and there is the usual coupling of two

Bob Burman Beats Oldfield in Match

Los Angeles Race Brings Out 20,000 Spectators

LOS ANGELES, Cal., Dec. 27—Special telegram—Bob Burman defeated Barney Oldfield today in the first of their 50-mile match races and in doing so he came very close to the half-century record, his time being 45:54, whereas Disbrow holds the mark at 45:32. Barney was 4 seconds behind Burman at the finish of a most sensational race.

Burman drove his French Peugeot and Oldfield started in his Fiat Cyclone. On the first lap, however, the timing gears on the Fiat were stripped and the crowd started to hiss the "master driver of the world." But Barney shifted to Earl Cooper's Stutz and the race was started over. His skill on the turns enabled him to hold Burman, but on the twenty-eighth lap Bob picked up a nail, which made a tire change necessary, which cost 17 seconds, in which time Barney gained $\frac{1}{2}$ mile. Then Burman threw discretion to the winds and went after his rival, catching him only on the forty-eighth lap and with only two laps to go.

It was an ideal day for the race and the largest crowd that ever went to Ascot park filled the stand. There were almost 20,000 spectators and the management was forced to close the gates. The track was dusty after ten laps. Burman carried no mechanic, while George Hill rode with Oldfield as usual. The race was from a standing start.

SIoux CITY WANTS JULY 2

Sioux City, Ia., Dec. 28—The 1915 Sioux City speedway race will be at 300 miles, for 450 inches and under cars, and the

purse will be \$25,000. In fact the conditions are the same as this year, the Hawk-eyes having refused to be switched from the larger motors by Indianapolis' decision to make its race for 300-inch cars. But Sioux City does not want the date of June 26, which was tentatively allotted by the contest board of the American Automobile Association, and it has asked Chairman Kennerdell to switch this to July 2.

Extensive improvements of the local track are contemplated for early spring, one feature will be the paving of the roadway leading from the city to the race course, a distance of about 5 miles, which will add materially to the comfort of the visitors who traveled to the track by motor car last year and were compelled to wait for sometime at various points, due to the congested conditions caused by the narrowness of the highway at these places. Covering also will be built over the boxes in the grandstand sections, the turns on the track will be elevated to allow greater speed and the entire track will be resurfaced with heavy crude oil and fine sand.

HOOSIERS IMPROVE RACE PLANT

Indianapolis, Dec. 27—Construction of a new grandstand at the speedway, seating 15,000 people, has been started on the south turn of the course, raising the total seating capacity of the plant to 75,000, which is equalled only by the new Yale bowl at New Haven. Over a mile of grandstands, the longest in the world, will soon be a speedway fixture. All stands are now covered, bleachers having been eliminated.

Additional improvements are the erection of a communal garage, accommodating forty cars, in back of the judges' stand—the old garages having been torn down, and their site turned into parking space—the widening of the track on the inside 15 feet, and the erection of a concrete safety wall all around. A clubhouse for drivers, complete with gymnasium, tennis court and swimming pool, also is contemplated for next spring.

BUILDING TEN-CYLINDER RACER

Minneapolis, Minn., Dec. 28—A ten-cylinder racing car for the 500-mile race at Minneapolis is being built by Lee Oldfield, now a resident of Minneapolis. Oldfield says the car will have 400 fewer parts than the ordinary racing machines; it will be air-cooled; the cylinders will revolve, doing away with a cumbersome flywheel; the entire weight of the car will be within 10 pounds of the weight limit of 1,600 pounds; the bore and stroke is to be 3 by 3, as it is to be a two-stroke motor. The motor will have a displacement of 300 cubic inches.

rods to one crank bearing. The outer rod is in yoke form and goes around the smaller inner rod. The engine uses a double-jet carburetor placed between the two blocks of cylinders and the electrical functions are cared for by a Remy two-unit outfit with an ignition distributor as a part of the generator.

The new Detroit eight has a wheelbase of 112 inches, multiple-disk clutch, three-speed gearset, floating rear axle and 33 by 4 tires on wood wheels; demountable rims, left drive and center control and platform rear spring suspension. The upholstery is in leather, finish brewster green and equipment complete. A sedan model will be fitted to the chassis also but it is yet too early to give the price.

In bringing out eights, the Briggs-Detroit Co. will not in any way curtail the production of its four-cylinder cars, it is stated by the company.

Rubber Interests Strive to Lift Great Britain's Embargo

National Automobile Chamber of Commerce Included in Windshield Suit—

Krit a Voluntary Bankrupt—Other Important Trade News

WASHINGTON, D. C., Dec. 29—Special telegram—Matters of vast import to motor car and tire manufacturers of this country are now under consideration by President Wilson and his cabinet, bearing on the European war. The subject of the rubber embargo has been receiving particular attention, and the negotiations have reached the point where the British government, while not willing to raise the embargo wholly, is ready to permit rubber from British colonies and from London to be shipped to America if manufacturers in this country who use raw product can give satisfactory guarantees that neither raw material nor manufactured articles will be sent to Germany or Austria. At this writing no action has been taken, although many influences are at work to lift the embargo.

NEW YORK, Dec. 26—Representatives of large rubber manufacturing interests, who have been conferring with representatives of the state department in Washington and of the British embassy with regard to the embargo which the British government placed upon shipments of crude rubber coming from Ceylon and the Federated Malay States in November last, state that they were unable to report substantial progress. The matter has been in negotiation with the authorities in Washington, with the British consul in this city, and with the British government in London for more than a month, but so far the latter has shown no disposition to agree to the suggestions made by the American importers and manufacturers.

According to certain authorities, this embargo is costing the rubber industry about \$250,000 a day and has sent the price of plantation up to 90 cents a pound, against the normal price of 45 to 55 cents. Roughly speaking, this means the cutting off of over 50 per cent of the normal supplies of crude rubber required by the industry in this country. Fine upriver Para went up from \$60 to \$76.

As a result of the war German chemists have been confronted with a number of important technical problems, chief among which are those of furnishing suitable substitutes for gasoline and rubber. No trouble has been found in finding substitutes for gasoline, as benzol and alcohol, the former being a by-product of the manufacture of coke, the production amounting to about 160,000 tons a year. About 100,000 tons are available for fuel purposes. There is no shortage of alcohol for motor purposes.

But the problems arising from the shortage of rubber are much more difficult than those arising from the fuel situation. The importation of caoutchouc, India rubber, has been interrupted, and the synthetic production of this material was neglected before the war. Several satisfactory substitutes have been evolved by combining acetone and benzol products with caoutchouc. A certain supply of caoutchouc can be maintained by the manufacture of re-

generated caoutchouc from scrap rubber.

The rubber problem in the United States has caused a syndicate in Akron to enter into contract with a number of ranch owners of Texas for the right to grow and gather the guayule shrub upon their renting several million acres of land. It is said to be the purpose of the syndicate to ship the guayule shrub to Akron where it will be manufactured into crude rubber. The construction of a large crude rubber factory either at Marathon or Alpine, Tex., also is said to be in contemplation. The value of the guayule shrub as a rubber-producing plant has been thoroughly demonstrated, it is claimed. Marathon, Tex., has the only factory making crude rubber in the United States.

N. A. C. OF C. INCLUDED IN SUIT

Cleveland, O., Dec. 27—Action was brought in the United States district court Thursday, making the National Automobile Chamber of Commerce co-defendant in the suit for infringement brought by William B. Hanlon, James R. Wardrop and the Anderson Electric Car Co., against the Rauch & Lang Carriage Co.

Legal notice is served against the National Automobile Chamber of Commerce, its patent committee, officers and directors, excepting the Anderson Electric Car Co. It names Windsor White, of the White Co., as one of the vice-presidents.

The complaint alleges that on February 16, 1914, they filed action against the Rauch & Lang Carriage Co. for alleged infringement of patent on shields for car windows, a patent issued to William B. Hanlon, of Pittsburgh, December 2, 1913. During the pendency of the suit, the legal papers read, negotiations were entered into between attorneys for the respective parties and an understanding reached. The documents in the case then were sent to the patent committee of the National Automobile Chamber of Commerce, the complaint alleges, and later on inquiry as to the action of that body the plaintiff's attorneys found and wrote:

"We are just in receipt of advice to the effect that the committee in question

recommended that the chamber intervene and that this action merely awaits formal confirmation by the directors at their next meeting."

"On September 14, 1914, the defendant's attorneys wrote the plaintiff stating that the board of directors of the chamber had taken over the defense and the matter was referred to F. P. Fish, patent counsel for the chamber, and desired the case postponed until November 14, 1914," the legal papers continue.

All delays since May, 1914, are charged to the chamber and it is alleged that the chamber's action permits the Rauch & Lang company to continue the use of the shield to which the Anderson company alleges it holds title. The petition asks that the chamber, its officers, committee and directors be made co-defendants in the suit. The complaint is represented by Bakewell & Byrnes, attorneys.

KRIT VOLUNTARY BANKRUPT

Detroit, Mich., Dec. 28—As a result of a meeting of the board of directors of the Krit Motor Car Co., and of the Krit Sales Co., held December 21, a petition of voluntary bankruptcy for both concerns was filed today in the United States district court.

In the petition signed by Henry W. Standard, president of both companies, it is stated that the concerns are unable to pay their debts in full.

The schedule filed for the Krit Motor Car Co. shows total liabilities of \$881,088.47 and total assets of \$622,533.27. The liabilities of the Krit Sales Co. are shown to be \$234,305.63 and the assets as \$256,814.70.

The detail of the liabilities of the Krit Motor Car Co. consists of the following items: Unsecured claims, \$693,233.19; secured claims, \$153,169; dealers' deposits—of which there are about 175—\$28,657.13; taxes, \$3,967.37; wages, \$2,061.78.

The following items make up the assets: Stock in trade, \$166,112.22; debts due on open accounts, \$125,574.20; patterns, drawings, \$92,220.81; machinery, tools, \$73,255.46; real estate, consisting of the plant and the land, \$156,400; trucks and cars,

\$4,150; furniture, \$3,346.27; notes receivable, \$1,150; cash on hand, \$188.45; deposits in bank, \$135.86.

The heaviest creditor is W. S. Russell, who is president of the Russell Wheel and Foundry Co., and vice-president of the Russell Motor Axle Co. To him \$308,736.53 is due. To the Russell Motor Axle Co., there is due \$81,137.81; to the Russell Wheel and Foundry Co., \$27,780.73; to the People's State Bank, Detroit, \$40,316.66; to the Northern Engineering Works, \$12,616.93; to the A. C. Knapp Co., top builder, \$11,735.59; to the Sieder Mfg. Co., top builder, \$11,335.63; to the Bosch Magneto Co., \$8,729.70. There are several hundred other creditors.

The liabilities of the Krit Sales Co. consist of \$140,712.26 unsecured claims and \$93,593.37 secured claims.

The assets consist of: Debts due on open accounts, \$134,881.71; stock in trade, \$120,498.49; notes receivable, \$1,085; insurance policies, \$210, and deposits in bank, \$139.50.

The Krit Motor Car Co. started in business in September, 1909, being capitalized at \$100,000. This capital stock was increased to \$500,000 a few years later. Two years ago the company was in financial trouble but its creditors at a meeting held September 2, 1913, arranged to continue the business, principally because W. S. Russell, the largest creditor—\$300,000 was due to him—agreed that he would not participate in payments of indebtedness until 50 per cent had been paid to the other creditors.

The Krit Sales Co. was organized in February, 1914, the capital of \$100,000 being furnished by several big creditors.

DETROIT CONCERNS SPLIT PROFITS

Detroit, Mich., Dec. 28—The King Motor Car Co. will distribute at least 10 per cent of its total profits for the year 1914 among all its employees, some time in January. About 200 men and women will share in the profits, as was the case in January, 1914, when 10 per cent of the profits made in 1913 were given all those connected with the company who are not stockholders. The share of each employee is determined according to his annual salary.

Following a custom which was inaugurated several years ago, the Ford Motor Co. has distributed a part of its annual profits in the way of a Christmas present among 200 to 300 heads of department, general foremen, factory heads, old employees not only with the plant here in Detroit, but with the various assembling plants, branches and foreign branches all over the world. The total amount is not disclosed by the Ford company, but some one connected with the concern said that it represented the output of about one-half the number of cars made in one day at the Ford plant, which would be from 800 to 1,000 cars.

The Federal Motor Truck Co. gave all

its employees, 150 to 200, a Christmas present in the shape of a deposit in a saving bank, representing 10 per cent of their wages for the year. The idea was rather novel and seemed to have been more appreciated by the employees than if checks or currency had been given. The reason of the Federal company in having the money placed to the credit of each employee was to instill further the saving habit among them.

STEWART PLANT ENLARGED

Chicago, Dec. 24—Plans have been made by the Stewart-Warner Speedometer Corp. for the erection of a six-story, reinforced concrete building adjacent to its present plant, the newly acquired site being 80 by 124 feet. This annex to the present plant, which is 190 by 250 feet, will allow the concern considerably more space for the manufacture of its speedometers, vacuum feed systems and other devices which has outgrown the present plant. This addition will give employment to approximately 300 more men and the addition will cost in the neighborhood of \$200,000.

FINAL REPORT ON HENDERSON

Indianapolis, Ind., Dec. 28—A final report has been filed in the circuit court by Joseph M. Smith, receiver for the Henderson Motor Car Co. The report shows that \$23,355.95 was received from the sale of cars and \$16,625 from the sale of stock. The receiver has turned over to the court

for the benefit of creditors, \$24,601. The claims filed with the receiver aggregated \$191,000 and a dividend of about 13 per cent will be declared. Prior to the appointment of the receiver, the business was conducted for a time by a committee of creditors, which was able to pay a dividend of about 20 per cent.

NEW KLAXON PRICES

New York, Dec. 29—On January 1 a new schedule of list prices goes into effect covering all models of Klaxon warning signals. The Klaxon type L or S will be \$20; the Klaxonet, \$15; the Klaxet, \$9; the hand Klaxon, \$7.50; the hand Klaxon with special bracket for motorcycles, \$7.50; the combination Klaxon with bulb horn, \$30; the combination Klaxonet, \$20.

BLOOD GOING TO ALLEGAN

Allegan, Mich., Dec. 26—The announcement is made that the efforts to have the Blood Bros. Machine Co. remove from Kalamazoo where it now is located to this city have ended successfully and contracts have been signed. The amount of \$50,000 which the Blood company asked that be raised by Allegan people has been over-subscribed, it is said. Just when the concern will locate here has not been ascertained, but it is rumored that when located here the company will arrange to bring out a small four-cylinder roadster and touring car which however will not be marketed until June or July.

Chalmers Announces New \$1,400 Six Addition to Line to be at New York Show

DETROIT, Dec. 28—Today the Chalmers Motor Co. has given out the details of its model 32 new six-cylinder car to sell at \$1,400, which is to be seen for the first time at the New York show. The motor is the most unusual feature of the new Chalmers in that it is a block-cast type with the camshaft overhead and operating the valves which also are in the head. The whole mechanism is completely inclosed.

The engine has a bore of 3½ inches and a stroke of 5 inches, and over 40 horsepower is claimed for it. Ignition is by Atwater Kent apparatus in connection with the Gray & Davis two-unit system of cranking and lighting. Other specifications include multiple dry-disk clutch, cantilever rear springs underslung from the axle, three-speed gearset on the rear axle, 120-inch wheelbase, 34 by 4 tires and frame following the lines of the body so as to give good support.

In connection with the motor construction, the cylinder head unit includes the valves and their cages and the camshaft assembly. When the head bolts are removed, the whole thing comes off and the pistons are exposed. The drive for the camshaft is by spiral gear. A shaft runs

transversely from the crankshaft to the right side of the cylinder block where it connects through spiral gears with a shaft running vertically upward to drive the camshaft. The shafting is all inclosed. The ignition distributor is located on the top of this vertical shaft, while the oil pump is at the bottom. Inlet valves are of nickel steel and exhausts of tungsten steel.

Other motor features are the use of Rayfield carburetor on the left side connecting to the block by a two-branch manifold, and combination splash and pressure-feed oiling. The camshaft is hollow and carries oil direct to the valve mechanism. Special sectional piston rings are used.

Drive is through inclosed shaft with the torsion tube bolting to the housing of the gearset. The axle is floating and has Timken bearings in the differential with Hyatts in the wheels. This combination of Timkens and Hyatts is used throughout the running gear, in fact.

The rear cantilever springs are 52 inches long with the main lead of vanadium steel. The car has left drive and center control and the fuel tank is in the cowl. Only the five-passenger streamline touring car is offered. It is fully equipped.

John I. Handley at the Head of a New Enterprise

Mutual Motors Co. Will Make Marion and Imperial

INDIANAPOLIS, Ind., Dec. 31—The Mutual Motors Co., with J. I. Handley as president and general manager, has been incorporated under the laws of Indiana. The company will be devoted to the building of motor cars in Jackson, Mich., in a plant which already has been provided and which covers 17 acres, the building proper being a two-story brick, 440 by 900 feet in dimensions.

"As the name of our new company implies, the moving principle underneath it all will be mutual coöperation," says Mr. Handley. "Six hundred thousand dollars of the \$1,000,000 authorized capital already has been contracted for. The Mutual will manufacture for two affiliated concerns, namely, the Marion Motor Co., the general offices of which will remain in Indianapolis, and the Imperial Automobile Co., the general offices and personnel of which will remain undisturbed in Jackson, Mich. The Mutual Motors Co. is strictly a manufacturing concern, and will in no way interest itself in the sales, or distribution of either Marion or Imperial cars, or any other cars hereafter added to its manufacturing program. Each organization will remain independent and complete within itself, simply engaging the Mutual Motors Co. to take care of the manufacturing end of its business.

"The new company will build the finished motor car as a unit, just as the parts makers heretofore have produced individual and component motor car units."

The directors of the newly-formed company are: B. M. DeLamater, president of the People's National Bank of Jackson, and of the Jackson Cushion Spring Co., Jackson, Mich.; W. S. Kessler, president of the Albion Malleable Iron Co., Albion, Mich.; W. R. Smith, treasurer and general manager of the Jackson Cushion Spring Co.; T. A. Campbell, treasurer and general manager of the Imperial Automobile Co.; J. I. Handley, president and owner of the Marion Motor Co.

J. I. Handley will take active management of the new company immediately and also will retain his present interest in the Marion Motor Co.

FORD WINS TRADEMARK CASE

Chicago, Dec. 29—Judge Kenesaw Landis in the United States court for the northern district of Illinois, eastern section, has handed down a decision in the case of the Ford Motor Co. against Fred Buck, doing business under the firm name and style of the Barry Sales Co. and Fred Buck, of Chicago, restraining the defendants from using the Ford name and trademark. This took the form of a permanent injunction, as follows:

1—Making, advertising or circulating any statement to the effect that the defendants are

agents for the sale of Ford cars in Chicago or elsewhere.

2—Using any window sign, business card, letterhead, or using in any other manner whatsoever the word "Ford" in dress and style indicative of complainant's trademark.

3—Employing any sign, banner or other device bearing or containing the word "Ford," "Ford cars," "Ford distributors" or other combination of the word "Ford" with other words or expressions implying that defendants are authorized agents to handle Ford cars.

4—Representing, indicating or implying that defendants have any relations or dealings with the complainant's factory at Detroit, or with the Chicago branch of complainant's business or with any other branch of complainant's business in any other city of the United States.

5—Acquiring a secret or undisclosed interest in any authorized agency of complainant to arrange for the sale of Ford cars and from inducing or attempting to induce any authorized agent of complainant to arrange for the sale of Ford cars in violation of any of the terms of the contract of such agent with complainant, and from inducing or attempting to induce any authorized agent of complainant to breach his or its contract of agency with complainant in any particular.

MORE PROFITS FOR FORD

Detroit, Mich., Dec. 24—During the fiscal year ending October 31, 1914, the Ford Motor Co. of Canada, Ltd., made a total profit of \$2,022,496.06, or over 200 per cent of its capital stock, which is \$1,000,000. At the same date the concern had \$1,804,846.30 surplus to its credit and its account of cash on hand and in the bank showed a total of \$1,257,032.35.

The balance sheet shows the total value of the assets at \$5,603,618.41. The liabilities total \$5,603,618.41. The report of the year shows that investments in buildings and building fixtures totals \$641,595, or \$73,710 more than in 1913; real estate holdings are recorded with a value of \$183,544, or an increase of \$22,500 over last year; the value of the machinery equipment is placed at \$590,415, or an increase of \$120,923 over 1913.

The real estate value of the company outside of the plant in Ford City is \$214,354 for Montreal, which is an increase of \$141,645 over last year; \$199,279 for Toronto, which means an increase of \$148,278, as compared with 1913, and \$23,186

WILL NOT MARKET ZOLINE

Indianapolis, Ind., Dec. 28—Zoline will not be manufactured and marketed, according to those who are interested in the company recently formed for that purpose. Zoline is a substitute fuel for gasoline, invented by John Andrus, a Portuguese inventor of McKeesport, Pa. Investigations which have been made have disclosed that the cost of manufacture is about the same as that of gasoline, and much higher than expected. Those who were interested in the Zoline Mfg. Co., which was incorporated with an authorized capitalization of \$100,000, are Carl G. Fisher, James A. Allison and Howard C. Marmon of Indianapolis; John Andrus and W. B. Chambers, of McKeesport, Pa.,

and H. B. Joy, Detroit. Zoline is the fuel which was used in the recent 1,000-mile Marmon test.

TO MAKE CROWN PRINCE WHEEL

Detroit, Mich., Dec. 28—The Crown Prince pressed steel wheel which is manufactured at Ohligs, Germany, and imported by Max Bachem, who introduced it to the American motor trade at the New York show of a year ago, will be manufactured in this country under foreign patents by the Detroit Pressed Steel Co., Detroit, maker of steel frames, and other parts of steel for the motor car. Mr. Bachem has been engaged as sales manager. He reports that the German factory is busy supplying the wheels to the government for war purposes in which field they have proven successful. The wheel is adaptable to both passenger cars and commercial vehicles, and presents much the same appearance as the ordinary wooden wheel to the casual observer.

TIRE-FILLER FAILURE

Chicago, Dec. 24—The Chemical Rubber Co., of this city, a concern formed for the purpose of manufacturing tire-fillers, has filed a petition in bankruptcy in the United States district court here with liabilities of \$29,165.17 and assets of \$155,225. The creditors are mainly stockholders of the concern, which was formed a few years ago as a corporation under the laws of Illinois. One of the largest outside creditors is the Commonwealth-Edison Co., which has claims for \$1,100 for electric signs.

ANOTHER CHANDLER DIVIDEND

Cleveland, O., Dec. 28—At a meeting of the board of directors of the Chandler Motor Car Co., the regular quarterly dividend of 1½ per cent on the preferred stock was declared, also a dividend of 2½ per cent on the common stock. This makes a total of 17½ per cent dividend declared on the common stock since July, or for the last 6 months. The report from the treasurer of the Chandler company shows that after the payment of all dividends, the company has been able to increase its surplus reserve which now exceeds the original cash capital.

ELECTRIC STARTER FOR PRINCESS

Detroit, Mich., Dec. 26—Beginning January 1, 1915, the two-passenger Princess car, made by the Princess Motor Car Co., will be equipped with the Disco electric starter and lighting system and will be fitted with all nickel plated trimmings. The price of the car will be \$495, or an increase of \$20 over the present price, which is without the electric starter and lighting system.

Jitney Buses Eat Up Profits of the Trolley Lines

Traction Companies Wage War on Motor Service

LOS ANGELES, Cal., Dec. 26—California, home of heavyweight ring champions and favorite breeding ground of earth rumbles, has introduced a motoring innovation and the calloused strap-hangers of two cities, Los Angeles and Long Beach, now believe that the long-promised millennium has arrived. The street car magnates are said to be foaming at the mouth, while thousands of their former dependents are celebrating a day of emancipation. This condition of affairs has been caused by the operation of "jitney buses" in the two cities, to the delight of the residents and the consternation of the stockholders in the local transportation corporations.

The "jitney bus" is nothing more than a common motor car, usually a Ford, although to the traction company magnates it looks like a dividend-eating, gasoline-breathing monster that threatens to drive them all to the poor house. In Los Angeles a fleet of 1,000, ranging in size from the five-passenger Ford to a twenty-passenger carryall, now are being operated over regular routes of from 2 to 5 miles in length. As a result, the trolley cars have lost much of their patronage and there is much wailing and gnashing of teeth at the directors' meeting of the transportation corporations.

The jitney bus charges a fare of 5 cents, the same as that charged by the trolley car. It is estimated that the 1,000 vehicles carry a total of 100,000 passengers every 24 hours and divert \$5,000 daily, \$150,000 monthly and \$1,800,000 annually from the receipts of the street railway company of this city.

The jitney bus made its first appearance in Los Angeles 3 months ago. It was looked upon as a novelty and few expected that it would last long. But the jitney bus had more endurance than Jim Jeffries ever possessed and gained greater popularity than Jim Corbett ever could boast. It was a synonym for comfort, luxury and speed. Strap-hangers hailed it as a deliverer. In the rush hours, it was looked upon as a chariot of triumph by thousands of shop girls and clerks who never had a chance to take a "load off their feet" in the crowded street cars.

The traction company and the operators of high-priced taxicab service in Los Angeles are up in arms. They have demanded of the city council more stringent regulation of the jitney bus and an increase in the present monthly license of \$5. Officials of the electric railway claim that their new competitors are responsible for an increase in the number of accidents and also charge that their franchise rights have been violated. The owners of the jitney buses have formed a protective association to fight the traction magnates and have strong allies in the oil companies, motor

car dealers and keepers of accessory and repair shops.

The plea for more stringent regulation and an increase in the license rate probably will be granted by the board of aldermen. The jitney bus owners at Long Beach recently were the victims of legislation, with the result that the number of vehicles operated was cut two-thirds. The license fee was raised from \$10 to \$25 a month and each operator was forced to post an indemnity bond of \$10,000 to cover accidents. Before the new ordinance was passed about

ules showing liabilities, \$54,045, and nominal assets, \$1,434,187, consisting of manufacturing and selling rights, \$1,300,000; stock, \$27,367; machinery in Passaic, \$29,961; accounts, \$29,837; motor cars, \$3,000; fixtures, \$3,279; cash in bank, \$9,645; cash on hand, \$111; notes, \$847, and insurance, \$409. The largest creditor is the Manhattan Rubber Mfg. Co., with \$44,306.

TRYING OUT U. S. ARMORED CARS

Washington, D. C., Dec. 28—Some experiments are being conducted by the



ONE OF THE JITNEY BUSES IN LONG BEACH

thirty buses were operated in Long Beach. They covered about 150 miles daily and several took in receipts of \$200 monthly.

CANADA ORDERING TRUCKS

Ottawa, Ont., Dec. 27—The much-discussed motor truck contracts are now being executed. While an official announcement on the subject has not been made pending the undertaking by the companies to follow certain prescribed conditions, it is well understood that the contract for the trucks, totaling about \$500,000, has been equally divided among the Kelly-Springfield company of Springfield, Mass., the White company of Cleveland, and the Packard company of Detroit. The average price is \$2,600 per car, and 150 trucks are to be ordered. In addition the militia department has been formally authorized to purchase additional motor vehicles, such as ambulances and light transports. The whole will cost between \$800,000 and \$900,000. A condition of the contract is that the companies who share in it must assemble the parts of the vehicles in Canada and do the work immediately.

OVERMAN TIRE FILES SCHEDULE

New York, Dec. 24—The Overman Tire Co., 1853 Broadway, has filed sched-

army ordnance department with improvised armored motor cars. These were obtained by purchase of motor chassis of the four-wheel-drive type, on which is being installed armor plate of a thickness and character similar to the shields of field artillery guns. It is estimated that such a car will cost about \$5,000.

The use of such vehicles in the European war has confirmed the view that they would be of great value under certain conditions. They furnish the means of extending the utility of armored railway trains, which are restricted in movement by the tracks over which they must travel.

Army officers who have looked into the subject appreciate that in Europe and under the conditions of roads to be found there, the armored car probably would be used more extensively than in this country, but the fact that they are readily constructed without the necessity of buying and storing large quantities of them and probably would be in readiness without much delay, appeals to the military authorities as providing an available means of protected transportation of marksmen. A vehicle of this character would carry two machine guns and eight men including the driver.



The Readers' Clearing House



COMMENTS ON HIGHWAY PLAN Says Beautification as Outlined Would Not Be Practical

GENOA, Ill.—Editor Motor Age—I read with interest your article in the December 17 issue on the work of beautifying the Lincoln highway and would like to suggest that, while the plan illustrated is fine, it is not practical. The farmers in this vicinity have found that a mass of trees and shrubs growing along the highway takes a great amount of fertility out of their fields adjoining, and that they soon cease to be a thing of beauty, as birds carry noxious weed seeds and the wild grape and Virginia creeper spring up and cover all in a very short time.

The motorist, on the other hand, will want as clear and unobstructed view as possible as he is most likely to be touring to see the country and not miles of trees and shrubs. Then, too, he will not want to eat all of the dust that will be thrown up in clouds by the other cars, as the shrubs will shut off the wind from blowing it away. Then, in the winter, when the snow begins to drift, we find that the only roads that are passable to motor cars are the ones where the weeds and brush have been cleared away, and in the spring, the road that has no trees or shrubs is the one that is the best.

I do a great deal of touring and find that the above will be found true in most of the central states.

I am greatly in favor of having a beautiful road but what is more beautiful than a soft velvety-green lawn with a tree now and then, not set as man would do but as if Nature had placed them there. Yours for good roads.—Charles Cole.

Size of Racing-Car Motors

Kansas City, Mo.—Editor Motor Age—What is the bore, stroke, and gear ratio of De Palma's Mercedes?

2—What are the gear ratios of E. Pullen's Mercer?

3—Give bore, stroke, and gear ratios of the Stutz which Oldfield drove in the Cactus derby.—J. E. Jordan.

1—The motor size of de Palma's Mercedes is 3.7 by 6.3. The gear ratio is not obtainable at this time.

2—This is about 2 to 1.

3—Oldfield's Stutz has a 4.83 by 6.00-inch motor. The gear ratio is slightly over 2 to 1.

Pope-Hartford Motor Sizes

Chicago.—Editor Motor Age—Is a motor with fast cams and large valves faster than the regular type when it is running?

2—Will it get away from a standing start quicker?

3—Will it throttle down as slow?

4—Will it pull on a hill or in the mud as well at intermediate speeds?

5—What type of motor is the Duesenberg?

6—What was the cylinder size of the Pope-Hartford four?—H. H. F.

1—The cams being faster mean that

they are so designed as to make the motor operate faster than the regular type cams.

2—Yes.

3—No.

4—Yes.

5—The Duesenberg is a four-cylinder valve-in-the-head motor.

6—The 1913 Pope-Hartford cars were made in four-chassis models, model 31 used a 4.32 by 5.13 motor, model 33 a 4.75 by 5.50 motor, and model 29 a 4.32 by 5.38 motor.

CONNECTING A MASTER VIBRATOR Meaning of Synchronized Ignition and Tungsten Valves

Newton, Miss.—Editor Motor Age—Kindly explain the difference between a short-stroke motor and a long-stroke motor.

2—What is the difference between a common valve and a tungsten valve?

3—Kindly give a diagram of the wiring of a Ford car with batteries, when a K-W master vibrator is used, the batteries being used only to start the motor.

4—Kindly explain the meaning of synchronized ignition.

5—In timing valves, is it not a fact, that when the valves for piston No. 1 are timed right, all the valves will be timed right, where only one camshaft is used as in an L-head motor?—J. W. Goodson.

1—Short-stroke motors are those whose ratio between stroke and bore is small and long stroke motors are those whose stroke to bore ratio is rather larger. Any motor with a larger bore than stroke naturally is a short-stroke motor and in the same class is placed motors of the square type or those with equal bore and stroke. Long stroke motors are considered usually to have a stroke-bore ratio of 1.3 to 1 or over.

2—A tungsten valve is made of tungsten steel and the common valve usually has a nickle-steel head or a carbon-steel head.

3—The master vibrator may be connected in between the source of current and the coil, as shown in Fig. 1.

In wiring it up you must short-circuit the vibrators on the four-unit coils so as to cut out the use of the condensers and vibrators of the present coils, thus allowing the master vibrator to interrupt the circuit for each unit in turn just as the timer closes the circuit.

4—Synchronized ignition is that in which the spark occurs at the same point in the cycle in every cylinder.

5—Yes, provided the valve tappets are adjusted properly for all valves. The cams automatically take the proper position if the cams of the first cylinder are correctly placed.

MEANING OF VARIOUS TERMS

Chrome-Vanadium, Phosphor-Bronze and Alternating Current Defined

Catawba, O.—Editor Motor Age—Define alternating and direct current, cantilever springs, open circuit.

2—What is the meaning of chrome-vanadium, phosphor-bronze, low-carbon steel?

3—Do all generators carry lamp load after a certain speed is reached?

4—Kindly give the cause of a piston sticking.

5—Does Bob Burman still hold the world's speed record?—R. W. Tavenner.

1—An alternating current is one which at certain definite intervals changes its direction and value.

A direct current is one which flows in one direction only. Direct current is that given by storage batteries, dry cells, etc.

A cantilever spring is shown in Fig. 2. It appears like a semi-elliptic spring reversed. The central portion of the spring is mounted on a trunnion and one end is fastened rigidly to the rear axle housing, while the other end is shackled.

An open circuit refers to an electricity-carrying conductor which is broken at some point so that it does not form a complete path for the current. If a wire is carrying electric current and the wire is broken the circuit is open because the current has no path. When a lighting switch is thrown to off position the circuit is opened, no current can flow and hence the lights go out.

2—Chrome-vanadium steel is steel which has been alloyed with a certain percentage of vanadium an element-metal and also a certain amount of chromium, another metal.

Phosphor-bronze is an alloy containing copper, tin, lead and a small percentage of phosphorus.

Low-carbon steel is that which has a small carbon content usually between .09 to .5 per cent.

3—Not all generators, but most of them, carry a lamp load at a certain speed.

4—Lack of lubrication or operating the motor without water are the common causes.

5—Yes. Duray traveled faster than Burman but the record is not official as it was not made in both directions as required by the foreign rules.

INCREASING LIFE OF LAMP BULBS Should Be Turned Around to Prevent Filament Drooping

N. S. Pittsburgh, Pa.—Editor Motor Age—Owing to the heat and vibration to which the incandescent lamps in the headlight are exposed, the delicate filaments sometimes have a tendency to droop downward. If this is not corrected in time, the filament will be short-circuited and the lamp ruined. The drooping may be remedied by giving the lamp one-half turn. In this manner, gravity will slowly bend the filaments back to the correct horizontal position.

The driver of a Ford car has some difficulty in reading the trip mileage when the speedometer is mounted flush on the dash.

To remedy this, a wedge-shaped block of wood should be cut to fit under the speedometer in such a manner that the face of the speedometer will be inclined at an angle of 15 degrees. This enables the figures on the dial to be read easily from the driver's seat.—Murray Fahnestock.

PRIMER FAILS TO HELP STARTING Says Cranking is No Easier—Reasons for Failure of Device

Akron, O.—Editor Motor Age—I have installed a priming device on my Ford, but it does not make starting any easier. The primer consists of a small can on the dash with hollow wire leading to a tap at a fork of the manifold. If the manifold or motor is cold one cannot get the proper mixture to start. The primer does not give the results I expected, in fact, it is no better than when I did not have it. Would batteries help starting in cold weather and would one get a hotter spark at starting than from the Ford magneto? How can batteries be wired to form a dual system?

2—When I apply the low-speed or reverse pedals they seem to grab instead of gradually taking hold.—Arcade.

1—Perhaps your hard-starting trouble is not due so much to a poor initial mixture as it is to insufficiently hot sparks. Perhaps the magneto magnets are weak or one or two connections not tight. If you drop a little gasoline into the inlet manifold and then crank the motor sufficiently to draw the charge into the cylinders it will explode provided there is a good spark. You should remember also that over-priming may cause hard starting. Do not allow too much gasoline to run into the manifold. A thimbleful of gasoline is sufficient for each cylinder.

Batteries would help and you can install a battery system by grounding one end of the battery and attaching the other to the blank side of the switch, or the one opposite the present magneto side. Use a 6-volt storage battery or you can use five to eight dry cells.

2—The bands evidently are too loose and if you cannot remedy the trouble by tightening the bands you will have to have them relined, the cost of which is slightly over \$3.

WHICH MOTOR HAS MOST POWER? Size Is Not the Only Factor—Dimensions of Regal and Reo

Belle Center, O.—Editor Motor Age—Which car develops more power, one with 3 3/4 bore and 5-inch stroke, valve-in-the-head motor, or one with 4-inch bore, 5 1/2-inch stroke of the L-head type?

2—What is the bore and stroke of the Regal and Reo cars?

3—Where is the Vellie car made?

4—Would Motor Age advise buying a car which was so large that it is necessary to equip it with blocks on pedals and large air cushions at the back of the seat in order to drive it?—Mrs. W. B. Ramsey.

1—The question is not answerable, since the size of the motor is not the only factor of power, nor is the location of the valves. Cam design, valve size, manifold design, design of the reciprocating parts are but a few factors.

2—The 1915 Regal has a bore and stroke of 3 3/4 by 5. The Reo company is manufacturing two cars, a four and a six, the former with a 4 1/8 by 4 1/2 motor and the latter with a 3/56 2 by 5 1/8 motor.

3—The Vellie is made by the Vellie Motor Car Co., Moline, Ill.

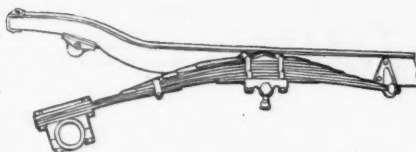


Fig. 2—Showing method of attaching a cantilever spring

4—If it can be handled easily with the changes outlined there should be no hesitancy, provided the rest of the specifications are desirable to you.

QUESTION ON ONE-WIRE SYSTEM Jacking Up Wheel Will Not Affect Lighting System

Lawrenceville, Ill.—Editor Motor Age—Is there a loss in current in a car that has one wire circuit when car is jacked up on concrete floor or ground?—Dr. D. D. Griffith.

The jacking up of the wheels of a car equipped with a one-wire system will not in any way affect the lighting circuits. The circuits are complete within the car and the ground upon which the car rests plays no part in the transmission of current. The ground in a one-wire system is some metal parts of the car, such as frame and the return current in the frame goes directly to the generator or storage battery, one terminal of which also is attached to the frame.

FITTING PLATES TO PISTON TOPS Hard to Tell Power Increase—How the Work Is Done

Monessen, Pa.—Editor Motor Age—What increase in power should I have by placing a 3/4-inch plate on top of the piston of a 1913 R. C. H. touring car?

2—Would 1/2-inch be thick enough?

3—How could same be secured to the top of the piston?

4—The company has advised me that it had increased the weight of the flywheel 8 pounds with good results. Would this change pay in results?—J. J. C.

1—It is not possible to foretell just what the increase in power will be. However, many owners who have fitted plates to the piston tops have increased the car speed more than 10 per cent.

2—The plates would be thick enough. In making the change you mention you must keep in mind that the stresses on the connecting rods, crankshaft, bearings,

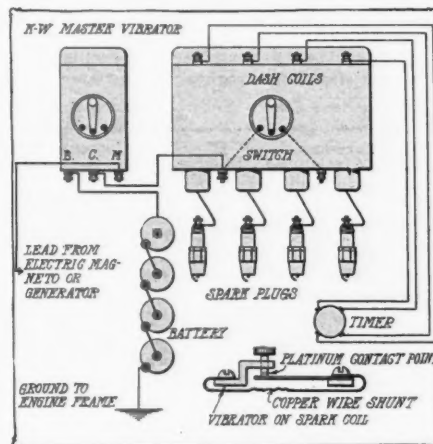


Fig. 1—Method of connecting master vibrator to Ford ignition system

etc., are increased and hence the life of the motor is decreased.

3—Riveting appears to be the best method.

4—No.

SPEED OF MANY TOURING CARS Stutz and Mercer Raceabouts Will Travel About 70 Miles Per Hour

Philadelphia, Pa.—Editor Motor Age—What is the speed of the following 1915 cars: Overland six, Peerless 48, Studebaker six and four, Pierce-Arrow 60, Jeffery four?

2—What is the horsepower of the 1915 Hupmobile and what is the speed?

3—Who makes the Premier car?

4—What car ranging in price between \$1,500 and \$3,000 will make 60 miles per hour?—Frederick H. Hooks.

1—All the cars you name with the exception of the Studebaker four and Jeffery four will travel about 55 miles per hour or more.

The maximum of the Studebaker and Jeffery four is about 50 miles per hour.

2—The S. A. E. horsepower of the Hupmobile model H is 16.90 and of the model K, 18.25. Fifty miles per hour is a good average speed for these cars.

3—The Premier is made by the Premier Motor Mfg. Co., Indianapolis, Ind.

4—The Mercer and Stutz raceabouts will travel about 70 miles per hour.

Question on Timers

Eldorado, Kan.—Editor Motor Age—Kindly explain how a high-tension current such as goes to the spark plugs can be distributed through the timer.—C. P. Pike.

A timer does not handle high-tension current. The current after leaving its source is sent to a timer, then through the primary winding of a coil and in the coil stepped-up to one of high-voltage, which is sent to a distributor, from whence it is sent to the spark plugs.

Wants to Change Carbureters

Burnett, Wis.—Editor Motor Age—What is the average miles per gallon of a Maxwell Mascot 1912 touring car?

2—What is the speed of this car?

3—I have been thinking of changing the carburetor on this car. What make would Motor Age advise installing?—R. A. Wock.

1—This car in touring form should show between 15 and 20 miles per gallon, depending, of course, on the driver, the load, etc.

2—Its maximum speed is about 40 miles per hour.

3—Any one of the standard makes will do. In writing to the carburetor manufacturer, state the year and model number of the car.

Questions Answered and Communications Received

Charles Cole.....Genoa, Ill.
R. W. Tavemer.....Catawba, O.
Murray Fahnestock.....N. S. Pittsburgh, Pa.
J. W. Goodson.....Newton, Miss.
H. H. F.....Chicago
Arcade.....Akron, O.
Mrs. W. B. Ramsey.....Belle Center, O.
Dr. D. D. Griffith.....Lawrenceville, Ill.
J. J. C.....Monessen, Pa.
Jack Sipes.....Milwaukee, Wis.
C. P. Pike.....Eldorado, Kan.
Frederick H. Hooks.....Philadelphia, Pa.
R. A. Wock.....Burnett, Wis.

No communications not signed by the reader's full name and address will be answered.



From the Four Winds



NEW Rainier Park Superintendent—John J. Sheehan, of Everett, Wash., has been appointed superintendent of Rainier national park, Wash., succeeding Ethan Allen, of Tacoma, who resigned. Sheehan has been city and county engineer at Everett.

Quebec Counts Its Motor Cars—A census taken late this summer of the number of motor cars in the Province of Quebec shows 7,025 passenger cars and 292 trucks. The city of Montreal alone has 4,422 passenger cars and 250 trucks, the remaining number being distributed throughout the province.

Death of E. H. Wemme—E. Henry Wemme, of Portland, Ore., died last week at Los Angeles. Mr. Wemme's hobby and life work was the development of the road to Mount Hood, which highway he owned and gave to the state of Oregon. It was one of his favorite boasts to his friends that all his work on the road was for the public and that he never would profit by it in the least.

Ambulances for Canadian Troops—Three motor ambulances have been offered by residents of Montreal to the field ambulance unit, now mobilizing for the second contingent expeditionary force. The offer has been made through the Red Cross Society and will be submitted shortly to Ottawa by Major H. B. Yates, president of the Red Cross Society. The names of the donors have not been announced pending the action of the militia department, but it is thought the offer will be accepted.

Making for Easy Starting—An unique and successful plan for keeping a motor car's engine at a safe temperature in an unheated garage during cold weather has been worked out by D. D. Sturgeon, an electrical contractor of Denver. When he puts the car away for the night or to stand several hours in extreme weather he lays a lighted 50-candlepower incandescent lamp right in on the cylinders. This keeps the motor at starting temperature in zero weather or colder and the self-starter works promptly without any trouble.

Colorado Bodies Elect Officers—The annual election of the Denver Motor Club resulted in the choice of the following officers for 1915: President, Carl Ph. Schwalb; vice-president, William J. Barker; secretary-treasurer, Charles F. Roehrig; auditor, Frank P. Bertschy, who succeeds himself. Schwalb has been secretary-treasurer of the club the last 2 years. The club election was followed immediately by that of the Colorado State Automobile Association, which selected as president E. E. Sommers, retiring president of the motor club. John Gaffy was made vice-president, and Charles F. Roehrig, secretary-treasurer. Nine directors also were elected.

Busy Secretary—At the recent meeting of the Bexar County Highway League, held at San Antonio, Tex., Secretary D. E. Colp made an interesting report in which he said: "During the past year your secretary has attended and taken part in 165 good roads meetings. Business men of San Antonio have assisted in sixty-five of these meetings. Actual returns in bond issues, \$2,336,000; federal money for the post road, \$80,000, making a total of \$2,416,000. Total amount of bonds voted for the entire state, \$6,400,000. The two bond issues in Wilson county and one in Kendall county were the only bond issues voted in Texas since cotton dropped to 6 cents; for that reason we consider these people the most generous of any counties in

need of bond issues, as they have not only provided money to build their roads, but have provided work for all who need it and will take advantage of it; also they can build their roads for about 65 per cent of the cost of what it would be if conditions were normal."

Good Roads Meeting in Denver—The Colorado Good Roads Association will hold its fifth annual convention in Denver January 20 and 21. This will immediately follow the annual meeting of the state association of county commissioners, which will have many of the road convention delegates and which will also give considerable time to the subject of highway improvement.

Pulcher Wolverine Club President—Martin L. Pulcher, vice-president and general manager of the Federal Motor Truck Co., was elected unanimously as president of the Wolverine Automobile Club, at a meeting of the board of directors. O. O. Dunk, president of the Puritan Machine Co., was named first vice-president; Dr. E. A. King, second vice-president; W. B. Bachman, secretary, and Harry J. Porter, of the Timken-Detroit Axle Co., treasurer. The Detroit club now has more than 1,800 members.

Smoke Peace Pipe in Des Moines—A 2-year-old breach between the motor car men of Des Moines and the management of the Iowa state fair is about to be healed as the result of a recent conference between committees representing the two factions. A compromise was reached and its adoption will be recommended to the state fair and the Des Moines dealers. The agreement fixes the space allotments and the rates to be charged. Des Moines dealers objected 2 years ago to the state fair rates and withdrew their exhibits because the fair board would not lower the prices.

Southern Route Popular—Robert H. Rinehart, president of the El Paso Automobile Club, is keeping a record of travelers who pass through that city to and from the Pacific coast. It shows that during December six to fifteen motor tourists per day went through El Paso en route to California. The travel in the other direction was very small. The route followed by these tourists is the Borderland and the All-Southern, and up to this time there has been little complaint heard of bad roads, although in some localities there have been heavy snows and rains. It is expected that when the Panama exposition opens the increase of travelers through El Paso to the coast will be large. Some of these parties carry camping outfits and spend the nights in the open.

Offers Free Course in Road Building—One of the most important adjuncts of the good roads movement in Kentucky is the free 2-weeks' course in highway engineering which is given each year at state university. The desire for good roads is practically ineffective without a large number of available men educated in how to build them, and to furnish this need the university has offered a course which will take only 2 weeks' time and will go far toward qualifying road builders for their work, and is given absolutely free to all citizens of the state. The course will begin this winter on January 4, and will be completed in time for the students who desire to secure county engineers' certificates to take the examination at Frankfort on January 16. More than fifty students were enrolled for the course last January and it is believed that double that number will at-

tend this winter. The students who attend the course will have the advantage of an interchange of ideas with more than 100 practical men, besides hearing the lectures of experts and witnessing demonstrations in practical road building and obtaining valuable information in regard to the best road materials and methods of applying them.

Girl Goes to Drive War Car—Miss Kathleen Dunsmuir, youngest daughter of James Dunsmuir, former premier of British Columbia, who sold his coal mines to MacKenzie & Mann for \$1,000,000 recently, has decided to serve her country at the front. She left last week for London, where she will take a course in ambulance work. She is an experienced motor car driver and is anxious to drive a motor ambulance in military service in France.

Buffalo Club Election—Joseph T. Snyder has been elected president of the Automobile Club of Buffalo, succeeding Maurice M. Wall. Other officers elected were: Vice-president, Arthur W. Kreinheder; treasurer, Henry R. Ford; secretary, Dai H. Lewis. These members were elected directors: Charles Clifton, George C. Diehl, Wesley C. Dudley, Clarence Sidway, Harry Thorp Vars, Maurice M. Wall, the retiring president of the club, and A. B. Wright.

After Car Thieves—The Automobile Club of Southern California has established a theft bureau. A squad of motorcycle operatives will be one of the features of the new bureau, which is claimed to be the first of its kind ever established. Special officers are to operate the bureau. Branches are to be established all over Southern California with headquarters in San Diego, Long Beach, Pasadena and Los Angeles. The county and city authorities are working in conjunction with the Automobile Club of Southern California bureau officers.

Planning for Grant Highway—Malcom MacKinnon, secretary of the Lake to River Road Association of Milwaukee, was in Rockford this week, relating the plans for the proposed Grant highway between Chicago and Dubuque via Rockford. The road will tap Galena and is named after the famous son of Illinois because Galena was the home of Grant. The cities of Elgin, Belvidere, Rockford, Freeport and Galena in Illinois will be on this route, which also will pass through Hazelgreen, Benton and Shellsburg in Wisconsin. At Dubuque the road will connect with the well-marked highway extending across the state of Iowa to Sioux City.

Canadian License Fee May Be Raised—A general increase in motor car taxation is apt to face Canadian motorists on the first of the year when they apply for licenses. While there has been no decision on the part of the government to increase the license tax, the matter, according to a statement made this week by W. H. Hearst, is under consideration. The big drop in provincial revenue, makes it necessary for the government to find other money sources and it is not unlikely that motor revenue raised now would be used for general purposes and possibly repaid out of the treasury later on when the condition of the world's markets and general financial conditions render it possible for the province and municipalities to start upon the proposed \$30,000,000 highways schemes, an action that will be appreciated by the motorists.



Among the Makers and Dealers



BRETZ Files Certificate—The J. S. Bretz Co., 250 West Fifty-Fourth street New York city, importer of F. & S. ball bearings, has filed a certificate of dissolution with the secretary of state.

Somers Carburetor Co. Organizes—The Somers Carburetor Co., Detroit, has been organized to manufacture the Somers carburetor. The officers of the company are James Somerville, president; David C. Mears, vice-president and James H. Means, secretary and treasurer.

Franklin Doing Big Business—That business conditions are improving in all parts of the country, is the claim made by the Franklin Automobile Co., of Syracuse, N. Y. In the first 2 weeks in December its buying orders increases 42 per cent over the rate maintained during November.

Federal Doubling Capacity—The Federal Rubber Mfg. Co., Cudahy, Milwaukee county, Wis., is having plans prepared for a factory addition, to be 44 by 124 feet in size, two stories high, of fireproof construction. The addition is part of the \$500,000 improvement scheme instituted about July 1 of this year. The capacity of the big tire works is to be more than doubled within a year's time.

Cobb to Address Makers—Irvin S. Cobb, the writer, will be one of the speakers at the annual banquet of the National Automobile Chamber of Commerce at the Waldorf-Astoria, Tuesday, January 5. There will be one other speaker and a decidedly new and novel form of entertainment, details of which the banquet committee decline to supply in advance.

Abbott-Detroit Occupies New Factory—The Abbott Motor Car Co. of Detroit, Mich., has moved to its new location in the A. C. Knapp Co. plant, corner Lafayette and Meldrum streets. The new home of the Abbott-Detroit is commodious, convenient and will afford excellent opportunities for economy in manufacture. It is interesting to note that the first Buick cars were built in a portion of this factory.

To Build Cars at Mount Pleasant—Mount Pleasant, Mich., is to have a motor car manufacturing establishment. L. J. Lampke has completed the first car of a design he formulated some time ago, and plans for the organization of a company and the manufacture of a limited number of the cars immediately are under way. The car is along the lines of the French design and is said to have a number of improvements original with the designer.

Republic Truck Expansion—The Republic Motor Truck Co., of Alma, Mich., has taken over the former plant of the Miller Saw Trimmer Co., and will use the newly acquired building as a paint shop. The old paint shop in the main building will be changed into an assembly room so that the capacity of the plant can be greatly increased. At present, this plant, only a year and a half old, is turning out motor trucks at the rate of twenty to twenty-five a week.

Maxwell Shows Prosperity—The Maxwell Motor Co. employed an average of 4,250 men daily for the months of August, September and October, 1913, with an average monthly payroll of \$296,956.24. The recapitulation statement for the same months of this year shows a daily average of 5,818 men, with a monthly payroll of \$427,809.52, or an increased payroll of \$130,853.28 per month. The 30 days of November of this year make an interesting comparison, and shows that business conditions are actually better with the Max-

well since the war was declared in August. The company employed 5,727 men daily during November of this year, as against 5,602 men in August of this year and 3,894 men in November of last year.

Tire Company Expanding—The announcement is made that Falls Rubber Co. has purchased the old plant of the wire mill company on East Broad street, Cuyahoga Falls, Ohio, which will be converted into a modern plant for the manufacture of tires.

To Sell Deaco Property—Referee in Bankruptcy Lee E. Joslyn, has ordered that the property of the bankrupt Detroit Electric Appliance Co., of Detroit, is to be sold at public auction by the Detroit Trust Co., trustee. The property, which consists of machinery, materials, supplies, tools, office fixtures and furniture will be disposed of either in one lot or in parcel. The bankrupt concern made the Deaco starter.

Making Shock Absorbers and Pilots—The Bar-Bar Mfg. Co., Hastings, Mich., has begun the manufacture of shock absorbers and pilots for motor cars. The company has offices in Grand Rapids, Mich. Edward M. Barnes of Hastings is president of the company and L. W. Barnhart of Grand Rapids is secretary and treasurer. Territory for the company's products now is being allotted.

Hazel Reserves Decision—Judge Hazel, in the federal court at Buffalo, reserved his decision in the matter of appointing a third receiver for the United States Light, and Heating Co., with head office in Niagara Falls. Guy M. Walker, chairman of the stockholders' committee of the Falls concern, argued in favor of a third receiver whose appointment is opposed strongly by the Central Trust Co. and Equitable Trust Co., both of New York city.

Money for Federal Truck Employees—A Christmas party was given by the Federal Motor Truck Co. to all its factory and office employees Thursday, the feature of which was the presenting to every one of them 10 per cent of their annual wages. Instead of being given in currency or checks, the money was presented in the shape of saving bank deposits, the Federal company believing that in this way the men and women will be more apt to continue the saving habit.

Boston Dealer Drops Dead—Don C. Tiffany, one of the first men to introduce electric vehicles in Boston and for the past year the agent there for the Ohio electric, dropped dead last week at his home. He had been at his office as usual, and after driving home, went into his house feeling tired, stretched out on a couch and passed away. He was a member of the Electric Motor Car Club and the New England section of the Electric Vehicle Association of America, having served both organizations as an officer since their formation.

Sues Dealer on Price Change—William C. Johnson, of Providence, R. I., has entered suit in the superior court against Herbert A. Capron, agent for the Pope-Hartford car in Rhode Island over the result of a drop in the price of the car. Johnson states that on April 14, 1914, he purchased a Pope-Hartford car, model 35, for \$2,310, under a warranty that the catalog price of the machine would not be cut before a new model was produced. At the time of the sale the catalog price of the car was \$2,250. In June, before a new model was produced, the price was cut to \$1,650. Johnson now claims that as a result of that cut in price he was not

able to trade in his car or sell it as a second-hand at so good an advantage as he would have been able to had the price been maintained. So he brings suit for \$1,000 damages.

Name Receiver for Standard Truck—George E. Braden, Warren, O., has been appointed receiver for the Standard Motor Truck Co., Cleveland, O. This court action is only temporary and is paving the way for negotiations and plans already practically completed which will carry the business on a larger scale.

Making Jacks at Grand Rapids—The Jiffy Jack Co. is Grand Rapids' latest addition to the motor car accessory manufacturing industry. Harry E. Hosken is the prime mover in the enterprise. The company makes jacks for raising motor cars, four jacks being the complement, two being used on each axle. A number of advantages are being claimed for the jacks, and the company is doing an excellent business, owing to the demand for jacks caused by the winter storing.

To Push Aluminum Business—To better designate the nature of the business under the new policy of devoting its entire attention to aluminum foundry business, the Western Iron Works, Manitowoc, Wis., has changed its name to Grimm Aluminum Castings Co. The entire plant is being overhauled and some new equipment installed, and in the future only aluminum castings will be produced. A campaign for business among motor car and motor manufacturers will be undertaken at once. Roland Grimm is president and general manager.

Invents Double-Grip Clutch—William Kromdyk, Jr., Niles, Mich., is the inventor of a double-grip clutch for motor cars and gasoline engines, which after having been tried and tested by several manufacturers, it is stated, will be manufactured at the plant of the Auto Tractors Co. Some time next year it is expected that a company will be formed and a plant erected, but temporarily the clutch will be made at the tractor company's factory under the direct supervision of Mr. Kromdyk, while his business partner, J. L. Fitz-Gibbons, will look after the business end.

Insular Agents for Oldsmobile—The appointment last week of J. M. Otero as the Oldsmobile representative for the island of Cuba with a location on Paseo de Marti, Havana, was one of two important recent developments in the campaign for foreign business which is being conducted by the Olds Motor Works. The other development was the allotment of the island of Porto Rico to Pietrantonio, Sojo & Co. Both are considered logical selections for handling the sales of the Oldsmobile small four, the demand for which, the makers state, is growing rapidly in foreign ports.

Ford Plans for Louisville Plant—An architect from Detroit was in Louisville recently to determine the plans for the new \$500,000 assembly plant of the Ford Motor Co., which is to be erected on the property of the concern at Third street and the L. & N. railroad crossing. The new structure will be four stories in height and will be similar to Ford assembly plants in other cities. It is planned to have the new building ready for occupancy when the local branch, now located at 931 South Third street, proves inadequate for the growing business of the company in this territory. This time is said to be not far distant.



Brief Business Announcements



Clio, Mich.—A motor car repair shop has been opened here by Fred Miller.

Clio, Mich.—Roy Dickinson has bought the interest of Thomas Warren in the local garage and Ford agency.

Victoria, B. C.—The Tait Tire Co. has taken the Diamond tire agency for Vancouver island.

Cobb, Wis.—Norman W. and Clyde Gibbs, of Clyde, Wis., have established a garage in this town and will handle several lines of cars.

Portland, Me.—The Spear Auto Co. has had its name changed to the Peterson Motor Co., due to a change in the personnel of the business.

Stevens Point, Wis.—George Kendall has established a shop at North Second street for general repair work on motor cars and vehicles, including trimming and painting.

Grand Rapids, Mich.—The repair shop formerly occupied by Bouse & Sons, at 1835 Plainfield avenue, has been taken over by Dewitt & Robinson.

Rockport, Ind.—Clarence H. Werner, formerly of the De Mott garage, has bought the Rockport Garage and Supply Co., which now will take the name of Werner's garage.

Grand Rapids, Mich.—Henry Blankfort has become the owner of the former Willey garage which from now on is known as the Colonial garage. It is located at Charles avenue and Wealthy street.

Louisville, Ky.—The Southern Tire Co. is the name of the firm which recently opened a new tire store at 453 South Third street. This concern, which is under the supervision of F. W. Potts, also owns and operates a store in Chicago.

Cincinnati, O.—J. A. Burgamy has organized a company to deal in motor cars of various makes as well as in tires and sundries. The business has been incorporated under the title of the Cash Buyers' Auto and Supply House, and will soon open at the southwest corner of Main and Canal streets.

Turtle Lake, Wis.—August Klingelhoets and Steven Schranski, of Downing, Wis., have purchased a site here and will build a garage for temporary occupancy at once. A fireproof building will be erected to supplant the garage now under construction next spring.

Madison, Wis.—R. A. Warner, who recently acquired the Cole and Overland agencies for the Madison district, has organized the Park Motor Co. to handle the agency and operate a garage at 124 West Main street. J. P. Gelespie is associated with Mr. Warner.

Milwaukee, Wis.—The T. S. Wheel and Mfg. Co., 254 Oregon street, placed on the general market its principal product, a ball-bearing resilient wheel for motor vehicles, which it has been perfecting for nearly a year. The concern was organized in April, 1913, with \$500,000 capital and a large shop has been equipped with dies, punches, milling machines and other tools. The wheel, invented by T. J. Smulski, formerly of Chicago, consists of twelve chilled steel balls, of 5/8-inch diameter, so arranged that as the wheel is forced upward by the resistance of the roadway, the axle is forced downward and the stresses equalized. The wheel is equipped with solid tires or sectional solid segments and is built in various weights and sizes corresponding to the weight of the car upon

which it is to be used. The guarantee is for 3 years.

Houston, Tex.—The Magnolia Motor Sales Corp. has been organized here with a capital stock of \$12,000. Incorporators, J. D. Kerr, Perry H. Carr and G. E. Gilmore.

St. Louis, Mo.—A. R. Anderson has been appointed St. Louis manager of the International Harvester Co. He succeeds Herbert L. Brubaker, who takes charge of the company's branch in Madison, Wis.

Minneapolis, Minn.—The Northwestern Tire Co. has taken over the northwestern agency for the Gibney solid tire. This is the first time the Gibney has been handled in the Northwest.

El Paso, Tex.—The Motor Bus Co. has been organized here with a capital stock of \$2,500 for the purpose of operating a line of motor buses. Incorporators: James V. Robins, John J. McCourt and J. W. Kirkpatrick.

Plymouth, Wis.—Manthey & Kissinger have leased the building now occupied as a garage and implement warehouse by Deicher & Arndt, who are building a large garage, and will take occupancy as soon as the place is vacated. The Manthey company will be incorporated as the Manthey & Kissinger

Recent Incorporations

Albany, N. Y.—Champion Electric Mfg. Co., to manufacture accessories; capital stock \$50,000; incorporators, Frank Scognamiglio, S. Scognamiglio, M. Lamparelli.

Albany, N. Y.—Coles & Backus, to manufacture motors, engines, machinery, vehicles; capital stock \$5,000; incorporators, R. H. Coles, C. E. Backus, E. A. Backus.

Albany, N. Y.—Mayville Hardware and Garage, Inc., capital stock \$25,000; incorporators, S. Swetlund, H. Arnold, A. H. Bruce.

Albany, N. Y.—Mutual Motor Sales Co., to manufacture and deal in motor cars; capital stock \$25,000; incorporators, G. Ozanne, J. B. Kalmuck.

Albany, N. Y.—Ridgewood Automobile Co., capital stock \$500; incorporators, A. J. L. Knight, F. C. Kreuscher, R. S. Kreuscher.

Antigo, Wis.—Utility Steel Tractor Co., to manufacture tractors and trucks; capital stock \$24,000; incorporators, S. D. Stewart, N. C. Nordin, F. A. Hecker.

Boston, Mass.—Dunbar Ave. Garage Co., capital stock \$10,000; incorporators, H. S. Rockwell, F. J. Rockwell.

Boston, Mass.—A. T. Hart Co., to deal in motor cars; capital stock \$5,000; incorporators, A. H. Perry, A. T. Hart.

Bronx, N. Y.—Champion Electric Mfg. Co., to manufacture electric devices for motor cars; capital stock \$50,000; incorporators, M. Lamparelli, S. Scognamiglio, F. Scognamiglio.

Brooklyn, N. Y.—Uno Garage Company, Inc., capital stock \$1,000; incorporators, H. D. Bristol, F. W. Shaw, C. Rossa.

Bucyrus, O.—Alter Motor Sales Co., to deal in motor cars and accessories; capital stock \$10,000; incorporators, L. D. Pickering, W. E. Drause, D. Kissling, E. Pickering, M. S. Drause.

Cleveland, O.—J. J. Erney Mfg. Co., capital stock \$3,000; incorporators, J. F. Folk, Jr., A. J. Kasch, J. F. Pavolik, F. J. Erney, A. A. Lutton.

Cleveland, O.—Gholson Auto Co., to deal in motor cars and supplies; capital stock \$10,000; incorporators, K. M. Gholson, W. F. Gholson, A. N. Meyer, E. Hayes, J. G. Murphy.

Cleveland, O.—K. E. Patch Co., capital stock \$1,000; incorporators, H. E. Laudeman, L. J. Kohn, L. M. Young, N. L. Black.

Columbus, O.—Rubbertown Tire Co., capital stock \$10,000; incorporators, O. J. Schwab, J. G. Carey, N. W. Greenberger, Fred Falch, H. A. Sullivan.

Detroit, Mich.—Auto Spray Co., to manufacture motor car accessories; capital stock \$10,000; incorporators, R. H. Evans, H. J. Skivington, D. H. Bentley.

Dover, Del.—Standard Devices Co., to manufacture motor car accessories; capital stock

Co. and operate a garage, salesroom, hardware and implement business.

Howell, Mich.—Cyril Head and Wilbur Fowler have purchased the garage business formerly conducted by L. Sims.

Milwaukee, Wis.—The Koban Mfg. Co., 241 South Water street, manufacturing detachable small gasoline engines, has increased its capital stock from \$25,000 to \$75,000.

Cleveland, O.—The Auto Repair Storage and Supply Co., of Cleveland, has filed papers with the secretary of state increasing its capital stock from \$5,000 to \$10,000.

Dayton, O.—The case of Max S. Glover, bankrupt tire dealer of Dayton, has been closed by Referee Cowden. In his final report to the court, the referee lists the liabilities of the bankrupt at \$5,851 and the assets at \$666. Glover's unsecured creditors received nothing.

Sheboygan, Wis.—The Gillette Motor Co. has been organized with headquarters at 406 North Seventh street, to handle the Ford in the Sheboygan county territory. The concern will work in connection with the Struening Garage, which has acted as Ford agent heretofore, and will continue to carry a large stock of Ford parts and accessories. The

\$50,000; incorporators, H. E. Latter, W. J. Maloney, O. J. Relcard.

Jamestown, N. Y.—Cole & Backus, Inc., to manufacture motors and vehicles; capital stock \$5,000; incorporators, E. Backus, C. E. Backus, R. H. Cole.

Logan, O.—Main Motor Car Co., capital stock \$25,000; incorporators, T. C. Johnson, A. H. Johnson, F. Spohn, F. A. Koppe, L. K. Keine.

Marshfield, Mass.—Marshfield Garage, Inc., capital stock \$4,000; incorporators, F. E. Chandler, W. C. Chandler, A. P. Goodell.

Mayville, N. Y.—Mayville Hardware & Garage Co., capital stock \$25,000; incorporators, A. H. Bruce, H. Arnold, S. E. Swetland.

Milwaukee, Wis.—Dennis Tractor Grader Co., capital stock \$10,000; incorporators, Philip Koehring, William Dennis, W. J. Koehring.

Milwaukee, Wis.—Pirate Motor Mfg. Co., to manufacture gasoline engines; capital stock \$50,000; incorporators, H. Roth, J. Tanch, J. Krohn.

New York—The John Mano Co., to deal in motor cars; capital stock \$1,000; incorporators, J. Mano, G. H. Miller, L. Cesky.

New York—New Denver Ford Starter Co., capital stock \$20,000; incorporators, T. J. McGovern, M. L. Efringer, J. Robinson-Duff.

New York—Ridgewood Automobile Co., capital stock \$500; incorporators, A. J. L. Knight, F. C. Kreuscher, R. S. Kreuscher.

New York—Royal Electric Motor Co., capital stock \$9,000; incorporators, A. Zwenitsky, I. Joffe, B. Schwartz.

Trenton, N. J.—The Self-Raising Seat Appliance Co., to manufacture motor car accessories; capital stock \$100,000; incorporators, S. M. Elsner, L. Lasser, S. O. W. Jackson.

New York—Vitaspark Corp., to deal in ignition devices for motor cars; capital stock \$10,000; incorporators, F. C. Scofield, R. Wellman, F. A. McGurk.

Potsdam, N. Y.—The Island Garage, capital stock \$5,000; incorporators, L. B. Bartholomew, W. H. Bartholomew, J. L. Dandy.

Quogue, N. Y.—Diamond-Apperson Motor Co., to deal in motor cars; capital stock \$15,000; incorporators, J. Renwick, Thos. Diamond, A. C. Warren.

Richmond, Va.—The Harrisonburg Auto Transportation Co., capital stock \$60,000; incorporators, A. W. Graves, H. M. Effinger.

Rochester, N. Y.—C. H. Washburne, to deal in motor cars; capital stock \$25,000; incorporators, C. H. Washburne, E. P. Washburne, E. H. Lamb.

Syracuse, N. Y.—The Resilient Steel Wheel Co., to deal in accessories for motor cars; capital stock \$25,000; incorporators, J. M. Grenan, C. Leonard, H. F. Leonard.

Trenton, N. J.—The Edge Auto Device Co., to manufacture accessories; capital stock \$25,000; incorporators, M. Binney, E. E. W. Earl, F. H. Meench.

Trenton, N. J.—The Gibraltar Tire & Tube Co., capital stock \$100,000; incorporators, H. L. Brown, R. Bradshaw, R. Brown.

Trenton, N. J.—The Three-Star Tire Co., to manufacture tires and tubes; capital stock \$50,000; incorporators, E. H. Stein, A. F. Updike, R. G. Whitehead.

Trenton, N. J.—The West End Garage & Machine Co., capital stock \$25,000; incorporators, E. B. G. Hancock, C. E. Hancock, W. T. Johnston.

Struebing Garage will represent the Sphinx and the Cole.

Ann Arbor, Mich.—A garage will be opened here during January by Elmer Reason, who will remove to this city from Stockbridge.

New York—J. C. Nichols & Co. have been appointed agents for Disco for New York and surrounding territory. Harry Knepper is sales manager.

Grand Rapids—F. W. Kramer, formerly manager of the Grand Rapids Overland Co., has severed all connections with that concern in order to devote his time to his other interests.

Chicago—William B. Levey, formerly purchasing agent of the Borland-Grannis Co. and later of the American Electric Car Co., has been made purchasing agent of the Auto Parts Co., of Chicago.

Detroit, Mich.—The Saxon Motor Co., has appointed C. L. McNulty southern district representative. Mr. McNulty was for several years a district representative of the Studebaker Corp.

Cincinnati, O.—In a suit filed in the court here, a receiver is asked for the Herff-Brook Motor Sales Co., conducted by P. C. Bertram and Albert Ertel. Bertram filed the suit. He claims that the company owes him \$223, and that Ertel has refused to live up to the articles of partnership or to render him an accounting.

Port Washington, Wis.—Walter and Otto H. Stelling, of Port Washington, Wis., have organized the Stelling Mfg. Co. to manufacture pocket flash lights and motorists' specialties.

Boston, Mass.—The McGraw Tire and Rubber Co., of East Palestine, O., maker of the Imperial, Pullman and Congress tires, and the McGraw solid tires, has opened a branch in Boston, at 667 Boylston street, with Wallace G. Page as manager.

Lansing, Mich.—An injunction against Roy O. Perry, doing business under the name of the Haight Auto-Lite Co., South Washington avenue, has been granted to the Prest-o-Lite Co., Indianapolis, Ind., by Judge Tuttle, of the United States district court, of Detroit.

It is held that the local company infringes the patents of the Indianapolis concern.

Adrian, Mich.—C. M. Johnson and Leonard Mitchell have purchased the garage business of John Wright & Co., and will handle the Ford.

Iola, Wis.—Swenson & Rosholt is the new style of the Swenson Bros. garage. Halbert Swenson has sold his interest to Jacob Rosholt, who becomes the partner of C. J. Swenson. The firm will handle the Overland, Ford and Case cars.

Black River Falls, Wis.—The Tollack Auto Co. has been dissolved, O. C. Flugstad retiring to give his attention to the Ford agency. Theodore Tollack continues the garage and repair shop and the Overland agency in this territory.

Schenectady, N. Y.—N. Charles Barron, until recently branch manager for the E. V. Stratton Co. at Schenectady, distributor of the Hudson, has taken over the Schenectady agency as a dealer, under the firm name of the Stratton-Barron Co.

Seattle, Wash.—James E. Bayliss has been appointed western district manager for the Cadillac Motor Car Co., succeeding Alfred E. Landman, who resigned to join partnership with Don Lee, Cadillac distributor in California. Bayliss formerly was representative of the Packard Motor Car Co.

Boston, Mass.—George M. Weatherbee and C. A. Orr, formerly of the Hollander Motor Car Co., of Boston, agent for the Cartercar, have formed a company to handle the Century starter for Ford cars with salesrooms at 29 Cambria street. Their territory includes Maine, Massachusetts and Rhode Island.

Indianapolis, Ind.—The Dickinson Tire and Machine Co. has been organized and incorporated with an authorized capitalization of \$1,000,000 at Indianapolis, Ind., to manufacture a tire-weaving machine invented by Fred S. Dickinson, of Bedford, Ind., and New York. The new machine will weave a tire in a solid piece, of the proper dimensions. The fabric will be woven bias to give maximum strength. The factory will be located in Indiana at a point yet to be decided. The

names of those behind the company have not been announced.

Milwaukee, Wis.—The Burgett Auto Co. has changed its corporate title to Milwaukee Motor Sales Co.

Manitowoc, Wis.—The Western Iron Works changed its name to the Grimm Aluminum Castings Co.

Boyer City, Mich.—The Pine Lake garage is the name of a new concern opened recently in the old postoffice block in this city by John Streeter and Loyal Newville.

Boston, Mass.—The Mattapan Motor Car Co., of Boston, was petitioned into bankruptcy last week by some of its creditors. It owes \$3,903.

Boston, Mass.—J. D. McIntyre, for several years superintendent of the service station of the Premier Motor Car Co., of Boston, has gone into business, opening a repair station at 29 Green street, Cambridge, Mass.

Detroit, Mich.—The Studebaker Corp. has appointed Henry T. Myers to the management of the department of delivery car sales. G. N. Jordon, traveling representative, succeeds Mr. Myers as manager of the corporation's Boston branch.

Los Angeles, Cal.—J. F. Reeves, formerly of Dallas, Tex., has been appointed California representative for the Pilot car, with headquarters at San Francisco. The Wilshire Automobile Co., of Los Angeles, will control the southern portion of the state.

Pittsfield, Mass.—The Central garage was sold last week to John E. Wood of Hoosick Falls, N. Y. Former Mayor H. D. Sisson, president of the Sisson Motor Co., which conducted the garage, will continue in the motor business as agent for several lines of cars.

Columbus, Wis.—J. E. Schunk, proprietor of the Schunk garage and F. C. Proctor, owner of the Proctor Implement Co., Columbus, Wis., have formed a partnership under the style of Schunk & Proctor to handle the Ford in this territory. Salesrooms have been established in both Schunk and Proctor stores.

Recent Agencies Appointed by Motor Car Manufacturers

PASSENGER CARS

Town	Agent	Make
Adrian, Mich.	C. M. Johnson & Leonard Mitchell	Ford
Binghamton, N. Y.	S. & O. Motor Car Co.	Moon
Binghamton, N. Y.	June Auto Co.	Saxon
Bartlesville, Okla.	R. G. Uhl	Moon
Black River Falls, Wis.	T. Tollack	Overland
Black River Falls, Wis.	O. C. Flugstad	Ford
Bowbells, N. D.	Heath & Drinkwater	Oldsmobile
Buffalo, N. Y.	Hurd-Landscheff Motor Car Co.	Moon
Belgium, Wis.	Hubing & Husting	Maxwell
Belgium, Wis.	Hubing & Husting	Ford
Columbus, Wis.	Schunk & Proctor	Ford
Columbus, O.	Auto Inn and Exchange	Argo
Cleveland, O.	Albaugh Motor Sales Co.	Princess
Crandon, Wis.	Sidney Raymond	Ford
Concord, Mass.	Torrey & Vaille	Ford
Chilhowie, Va.	Jas. L. Vance & Co., Inc.	Oldsmobile
Carmel, Cal.	George Schweninger	Oldsmobile
Deadwood, S. D.	Geo. Kilker Garage and Supply House	Oldsmobile
Denver, Colo.	T. Botterill	Dodge
Denver, Colo.	George A. Estabrook	Briscoe
Denver, Colo.	Harry E. Malnes	Monroe
Greenville, O.	E. R. Swinger	Overland
Great Bend, Kans.	Great Bend Hdwe. & Imp. Co.	Moon
Hartford, Conn.	Kingsbury & Wetherell	Moon
Havana, Cuba	J. M. Otero	Oldsmobile
Ithaca, N. Y.	E. J. Trapp	Oldsmobile
Iola, Wis.	Swenson & Rosholt Garage	Ford
Iola, Wis.	Swenson & Rosholt Garage	Overland
Iola, Wis.	Swenson & Rosholt Garage	Case
Ionia, Mich.	R. H. Van Vleck	Monroe
Kingston, N. Y.	Stryker & Youmans	Moon
Liberal, Kans.	W. O. Woods	Moon
Lynn, Mass.	John J. Hunt	Reo
Los Angeles, Cal.	Lynn C. Buxton	Lexington
Los Angeles, Cal.	Lynn C. Buxton	Howard
Leeburg, Pa.	Young & McKutchen	Ford
Lowell, Mass.	A. P. Sackley	Crow
Madison, Wis.	Park Motor Co.	Overland
Madison, Wis.	Park Motor Co.	Cole
Prairie du Sac, Wis.	Lloyd Tarnutzer	Dodge
Pasadena, Cal.	A. L. Ryder	Mitchell
Pasadena, Cal.	A. L. Ryder	Stearns-Knight
Pasadena, Cal.	W. J. McCulley	Oldsmobile
Rochester, N. Y.	W. M. Kipp	Moon
Rhineland, Wis.	Onelda Garage Co.	Ford
Scranton, Kans.	Sappenfield & Co.	Moon
Summit, N. J.	Frank A. Wahl	Oldsmobile
Schenectady, N. Y.	C. C. Kehoe	Oldsmobile
Sheboygan, Wis.	H. Struebing Garage	Cole
Sheboygan, Wis.	Gillette Motor Co.	Ford
Sheboygan, Wis.	H. Struebing Garage	Sphinx
Stamford, Conn.	Harold Hendrie	Moon
Worcester, Mass.	J. V. Ekberg	Paige-Detroit
Wabash, Ind.	John W. Bloomer	Oldsmobile
Waverly, N. Y.	State Line Motor Co.	Moon
Wichita, Kans.	H. W. Schroeder	Moon
Washington, D. C.	Burger Motor Co.	Hupmobile
Washington, D. C.	Combs-Howard Co.	Jeffery
Xenia, O.	Martin H. Schmidt	Buick

COMMERCIAL CARS

Cincinnati, O.	Bauer Motor Co.	Denby
Seattle, Wash.	Waterhouse-Sands Motors Co.	Signal



The Motor Car Repair Shop



Hub Cap as a Wheel Puller

IT sometimes is necessary to remove one of the rear wheels of the Ford car and a regular wheel puller is not always available. There is a method that can be used in which the hub cap becomes part of the device. A hole is drilled or punched through the center of the hub cap for a $\frac{1}{2}$ -inch bolt and a bolt about 4 inches long is placed in the hole. The nut is placed on the bolt inside of the hub cap as shown in Fig. 1. Melted lead or solder is poured around the nut to hold it to the cap. By first placing the hub cap on the wheel and then turning the bolt, the wheel will be forced off the axle. Another method that is more crude and much slower, is to leave the nut loose without soldering it to the hub cap and so adjust the bolt that when the cap is screwed on the hub, the end of the bolt will be forced against the axle and thus push the wheel off. The hub cap should be allowed several threads on the hub before the end of the bolt touches the axle. This will only pull the wheel off about $\frac{1}{8}$ inch at a time and requires the cap to be put on and taken off several times before the wheel can be removed.

Changing Horn Bulb Location

Some Ford drivers prefer to climb into the car at the left hand side, rather than disturb the seated passenger. This is more easily done if the lower screw is removed from the clip holding the horn bulb and the bulb swung down to a horizontal position and the screw driven into the wood as shown in Fig. 2. This also makes the bulb less noticeable and improves the appearance of the car by concealing the horn bulb within the body lines where it may be operated by the knees of the driver if desired.

Repairing Keyways

When keyways become worn the first thought of the owner is to file the channel evenly and fit a larger key. However is often happens that the shaft is rather small in diameter and the increase in size of the keyway tends to weaken the metal. Welding is a good remedy for worn keyways. In this process new metal is welded into the old slot and then a new keyway cut the same size as the old one. The welding of parts sometimes affects an appreciable saving in money to the car owner. The oxy-acetylene welding system has been so perfected, that today, almost any break can be repaired by this process. A cylinder waterjacket cracked on the inside may be repaired at slight cost as compared with the cost of a new cylinder. Broken crankshafts, connecting rods, etc., require comparatively little time for welding and owners who have car parts which have be-

Some Hints for Ford Owners

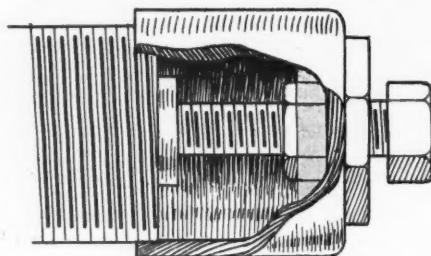


Fig. 1—Showing how a hub cap may be used as part of a wheel puller

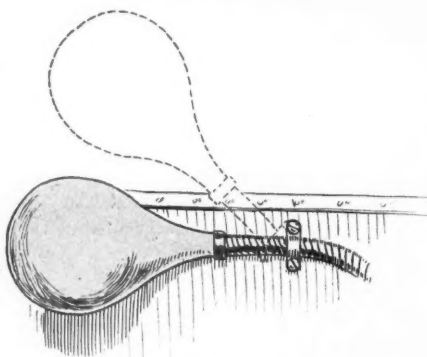


Fig. 2—The horn bulb on Ford cars may be replaced so as to make entrance from the left side less difficult

come broken should not hesitate in consulting with a good welder to ascertain whether the repair by welding will be worth while.

Valve in Water Supply Pipe

An owner who wished to use his car during the cold weather recently, removed the rubber hose between the top of the cylinders and the radiator and replaced it with a metal one containing a shut-off valve of the butterfly type, such as are used on carbureters. A rod from this valve extended through the dash, and enabled the driver to regulate the amount of water flowing through the system. This gave greater mileage per gallon, smoother motor operation, and easier starting be-

cause the temperature of the water was controlled by the flow.

Air Leaks and Misfiring

One common cause of misfiring, which is overlooked to a great extent, is due to air leaks. A worm valve guide not only allows air to be sucked into the cylinders but permits oil to flow out. In fact, a fair test of a leaky valve stem guide is to look for oil which has leaked through.

The gasket between the carburetor and header may be turned or torn causing an air leak.

A valve stem sometimes is covered with gum or the seat of the valve with dirt, so when the valve opens the tendency is to remain open, or when it closes fully, to remain closed. The valve should operate freely in its guide. It is a good idea to remove the valves every 3 months or so and clean and polish the stems.

Cylinder plugs often give much trouble. Dirt under the gasket, a turned gasket or a torn gasket usually are equally as bad as a poor air adjustment of the carburetor. A good test, and one which is familiar to all more or less, is to pour a little oil around the plug while the motor is running. If small bubbles appear it is an indication that there is an air leak around the plug.

Care of the Rims

Many motorists in changing rims have experienced the annoyance of the rusting of the parts to one another, of the tire to the rim, and of the threads on the turn-buckles, on those types where these are employed. The usual recourse in such a case is to condemn first the rim, then the maker of it, then the manufacturer who installed it on his car, and finally the tire that was so indiscreet as to stick to the rim. The tire usually is put back on the rim, to rust still more firmly to it. Very seldom does one in such a predicament think of blaming himself for the trouble, and yet the fact is that a properly cared for rim, of any type, never will be found in this condition.

New rims are always sent out from the factory japanned, and if kept so, never will give any trouble from rusting. But it always is not possible to procure suitable japan for this purpose, and it always should be baked on. Japan, like any other enamel, will wear off in time, and if steps for prevention are not taken, the rim will rust. An easy way to prevent this is to heat the rim with a blow torch, and apply beeswax. This will form a new combination with the rust, which will prevent further rust forming. It perhaps will be advisable to renew the application of the wax as each tire change or renewal is made by the owner.

Anti-Freeze Solutions

Will not freeze at 15 degrees above

zero:
Water 4 gal.
Alcohol $\frac{1}{2}$ gal.
Glycerine $\frac{1}{2}$ gal.

Will not freeze at 8 degrees above

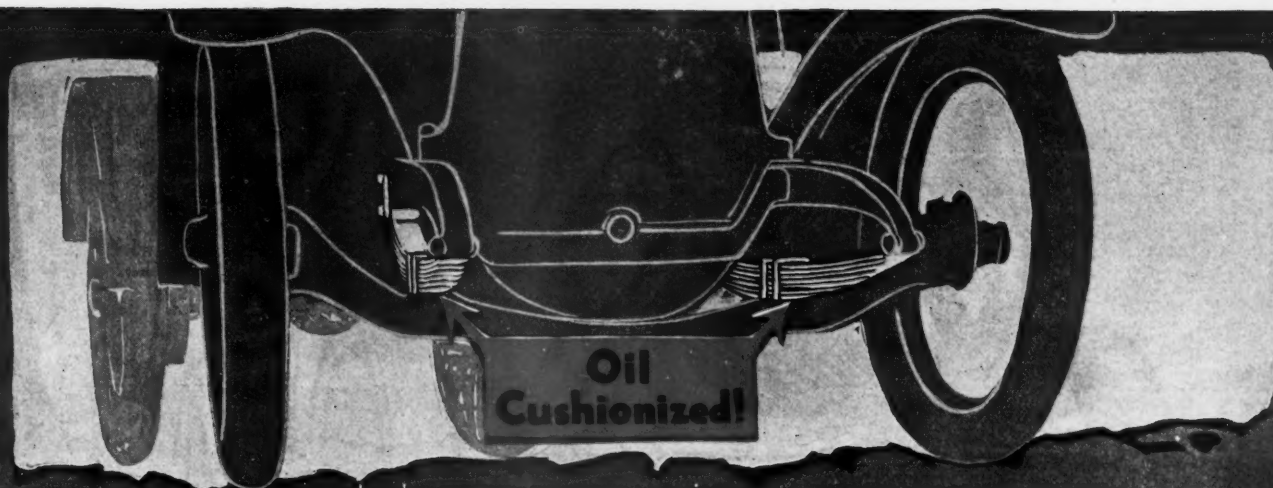
zero:
Water $3\frac{3}{4}$ gal.
Alcohol 5 pt.
Glycerine 5 pt.

Will not freeze at 10 degrees below

zero:
Water 3 gal. 1 pt.
Alcohol 5 pints
Glycerine 5 pints

Will not freeze at 20 degrees below

zero:
Water 1 gal. 1 qt.
Alcohol 2 gal. 2 qt.
Glycerine 1 gal. 1 qt.



Best Shock Absorbers for Front and Rear—"OIL CUSHIONIZED" SPRINGS

Springs are the **natural** shock absorbers with which every car is equipped. They are the **only** shock absorbers carried by the great majority of cars. The efficiency of these springs as shock absorbers depends on proper lubrication. The best shock absorbers are springs which have been "Oil Cushionized" with

DANN INSERT "The Insert of 10,000 Oil Pockets"

"Oil Cushionized" Springs are the most satisfactory insurance against hard riding.

"Oil Cushionized" Springs never rust, squeak nor dry. They perform their normal function of a shock and vibration dampener. It is impossible for them to clog with rust and become vibration conductors.

"Oil Cushionized" Springs lengthen car life by smothering mechanism killing road "pound."

DANN Insert is the only article on the market that keeps springs—year in and year out—as supple, resilient and sensitive as the car manufacturer intended them to be.

See to it that your car's natural shock absorbers are given the attention they deserve. DANN Insert comes ready-packed in sets for any make or model of car. Write for pamphlet on "What Users Say."

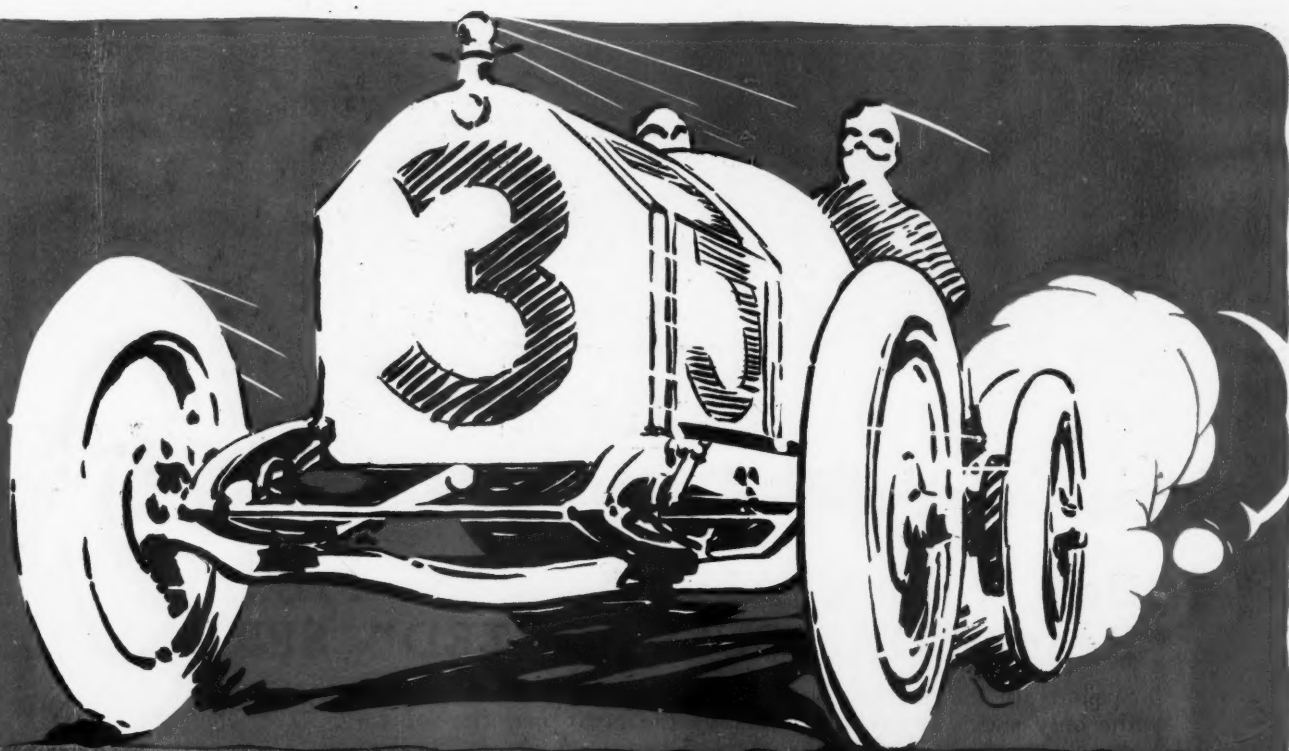
AT THE SHOWS

See us at New York, Grand Central Palace, Space D 31A, or at Chicago, Coliseum Annex, Spaces 153-154. Our exhibit will be one of the most interesting and sensational features. Don't miss it.

DANN OIL CUSHION SPRINGS—furnished complete with DANN Insert ready installed between their leaves—are a new addition to our line. Supplied for any make or model of car. Dealers, write.

DANN OIL CUSHION SPRING INSERT COMPANY
2252 Indiana Avenue, Chicago, Illinois





SCHEBLER

WORLD'S RECORD CARBURETOR

STANDARD
EQUIPMENT
ON AMERICA'S

CHAMPIONS

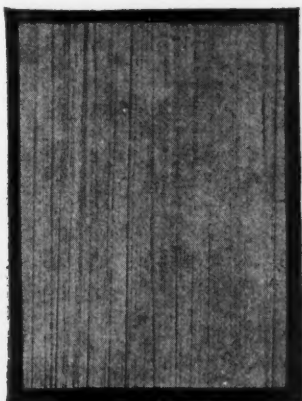
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WHEELER AND SCHEBLER

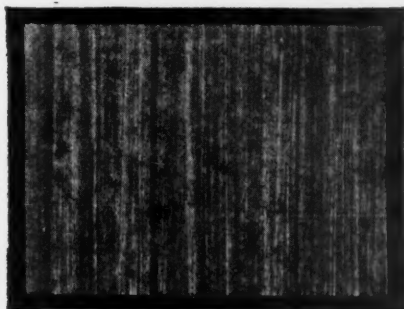
INDIANAPOLIS

INDIANA U.S.A.

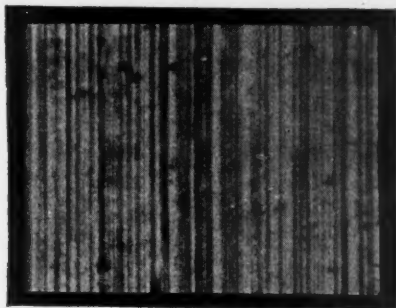
NEW DEPARTURE BALL BEARINGS



Micro-photograph of New Departure ball race, showing superiority of New Departure finish.



Micro-photograph of ball race of competitive bearing.



Micro-photograph of ball race of competitive bearing.



American Made for American Trade

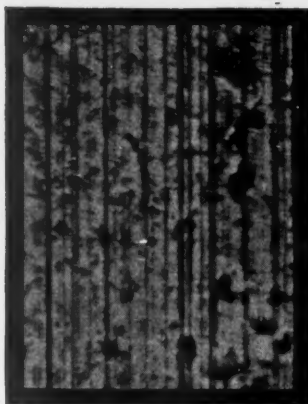
SCIENTIFIC design, faultless steel, accuracy of manufacture, and perfect finish of all working surfaces are essential to an efficient ball bearing.

Fundamentally important is the steel.

New Departure Ball Bearings are made from Chrome Alloy Steel, unsurpassed in all of the peculiar qualifications that have brought these American-made bearings to their present state of perfection.

New Departure manufacturing facilities are unsurpassed.

The New Departure finish of all working surfaces, in comparison with many others, speaks for itself, not only through micro-photography, but in friction elimination and the wearing quality of the New Departure product itself.



Micro-photograph of ball race of competitive bearing.

All this — plus quantity production, prompt shipments and expert service have combined to make New Departures the Quality Bearings of the World.

THE NEW DEPARTURE MANUFACTURING CO.

Distributing
Agents in Trade Centers
Throughout the United States

BRISTOL, CONN., U. S. A.

Western Branch
1016-17 Ford Building
Detroit, Michigan



Polite Whisper

Quick, Clear Warning

Stern Command

Loud, Long-ranged, penetrating Signal

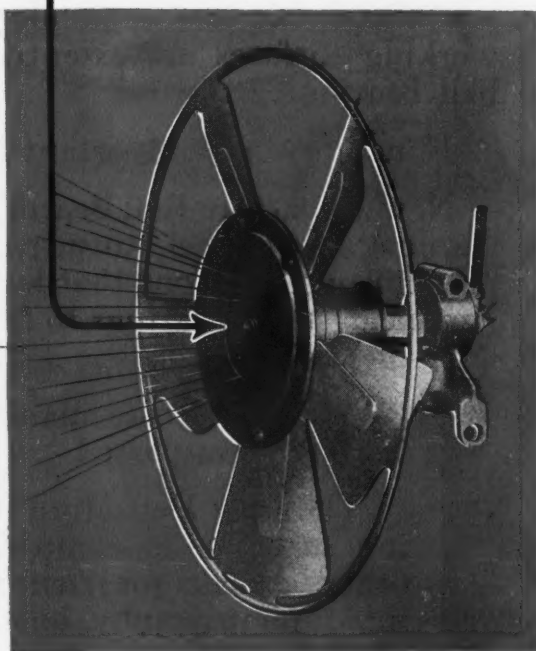
Touch the button and get any volume or range you need.

Not an Electric Horn.
Operated mechanically.
Integral Part of Fan.

The diaphragm is fastened to the central portion of the cooling fan assembly and rotates with it. Inside the fan is a stationary piece which causes the diaphragm to vibrate when brought in contact with the latter. This stationary part is operated by small lever at back of fan bracket. Does not dim lights because it is not an electric horn. You don't have to try several times to make it sound—it responds instantly the first time.

Beartone

Horn and Fan Combined



Never Fails. Instant response.
The Safest Signal.

The *Beartone* has no gears, motor, wires, or batteries to go back on you when you need your horn the most—or to get out of order. Let us prove for you (by tests of automobile engineers) that the Oakes fan is the best. You get the Oakes fan with your *Beartone* horn—they are both one unit—and can be substituted for the fan on any car by anyone in a minute. It will last forever. The *Beartone* has no motor to stick in cold weather. No battery expense.

Dealers, Get Our Money Making Proposition—

and get it quick! It's to your advantage to become connected with America's greatest fan manufacturers. We would never have entered the horn market if all we had was another complicated and troublesome horn with nothing new but a label. The *Beartone* is *new* and *better*—a new principle entirely.

It replaces other horns as the self starter has replaced cranking. No other horn has half the arguments in its favor the *Beartone* has. The instantaneous success of the *Beartone* is only a hint of its tremendous popularity the minute the public learns about it. You should get in on the ground floor—be among the first. Already, without a single public announcement, the *Beartone* has created a big demand. There is no horn similar to it—your profits will not be divided among other “just as good horns” because there is

For the
Ford Type
retail

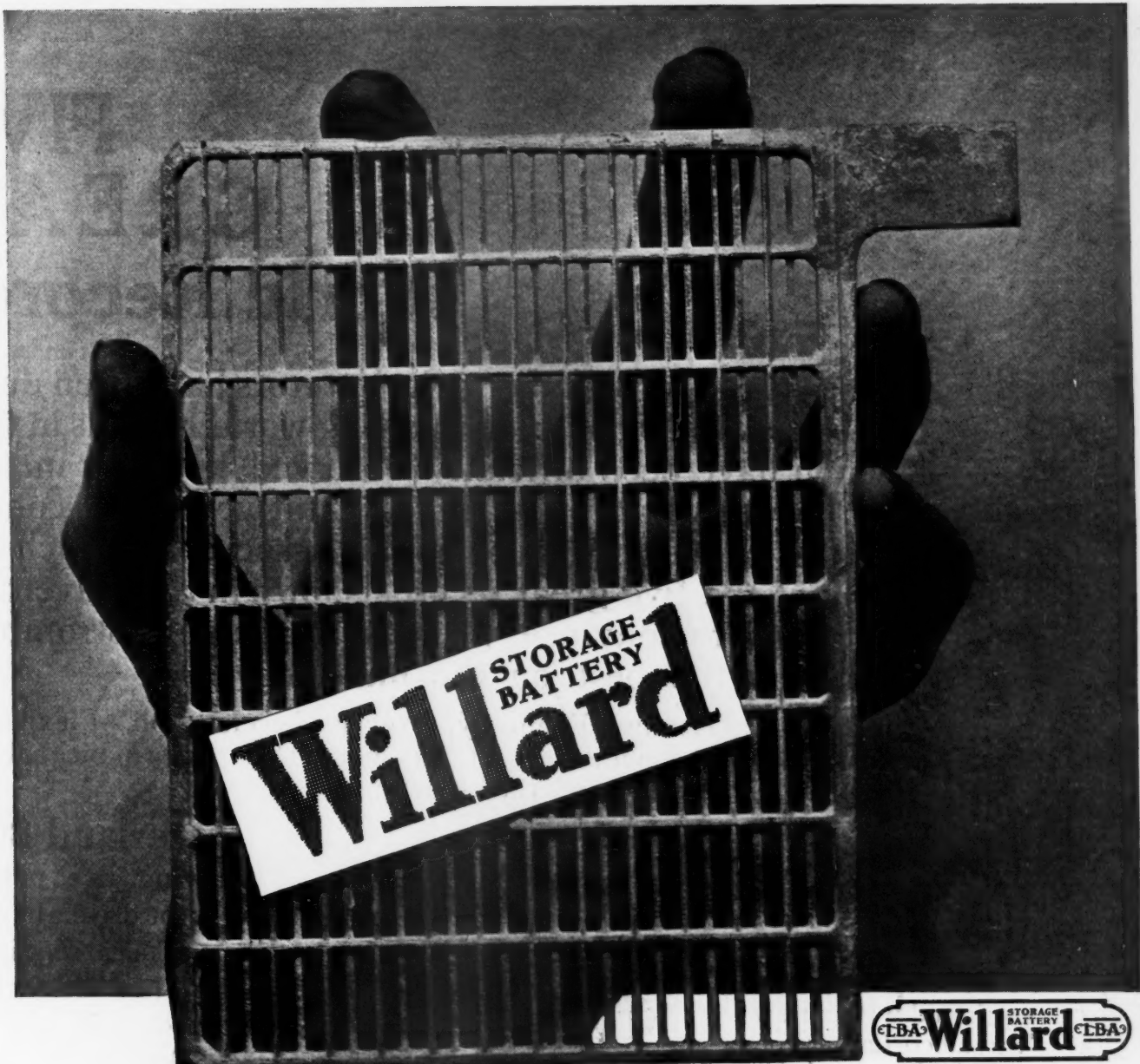
\$7



only one fan-horn, the *Beartone*, and motorists can not confuse it with the old inefficient and unreliable types. Read what one dealer writes—“It is the cleverest arrangement we have ever found for a signal. We want you to give us the exclusive agency for this territory for all cars.” This is the way they all talk when they learn about the *Beartone*. There is big money in it for you—but write us at once—our plan for co-operating with dealers insures success—and profits—from the start. There is no end to the *Beartone* business, but the wise dealer will start now. Let us explain.

THE OAKES COMPANY, INDIANAPOLIS, IND.

When Writing to Advertisers, Please Mention Motor Age



Anybody Can Make a Grid, but—

It takes experience and knowledge of a high order to make a thoroughly satisfactory storage battery plate.

With twenty kinds of lead oxides and twenty different ways of mixing them there is an unlimited number of ways of going wrong.

Eternal vigilance is the prime factor—and every operation in the Willard plant is followed by inspection. Every pound of metallic lead has to be up to the Willard standard. Every grid is inspected when it comes from the mold. Samples of every keg of oxide go to the laboratory for inspection and testing. When the oxides are mixed they are

tested. When the plate is pasted it is inspected, and again after it is dried. While the plates are "forming" the temperature and specific gravity of the electrolyte are under constant inspection and readings of the terminal voltage taken hourly.

Every batch of plates is subjected to laboratory test, and so is every lot of completed batteries.

Inspection is not the only reason that 85% of all makers of electrically equipped cars specify Willard Batteries, but is one of the big reasons for their uniformly good service and long life.

Willard Storage Battery Company

Cleveland, Ohio

New York: 228-30 W. 58th St. Detroit: 736-40 Woodward Ave.
Chicago: 2524-30 S. Wabash Ave. San Francisco: 821 Monadnock Bldg.
Indianapolis: 318 North Illinois Street
SERVICE STATIONS IN ALL PRINCIPAL CITIES IN THE UNITED STATES, CANADA AND MEXICO

When Writing to Advertisers, Please Mention Motor Age.

**Record
Economy Test
29 Miles on One
Gallon of Gasoline
56.9 Ton Miles
Overland Model 80**

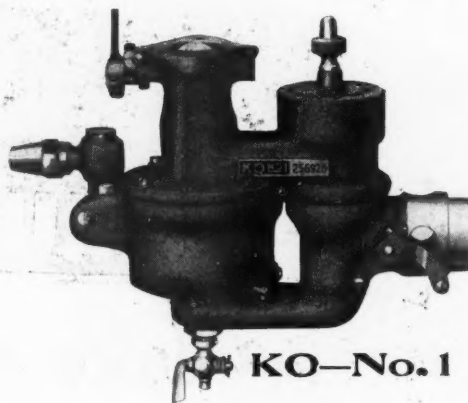
FIVE GREAT World Records

The new Stromberg Carburetors have been doing things. They have been making world records in tests which have been officially observed by such men as F. E. Edwards, technical representative of the contest board of the American Automobile Association. Each and every one of the five great records shown in this advertisement is enough to convince you that these new Stromberg Carburetors are the best on the market.

There are records in Gasoline Economy, Power, Acceleration, Flexibility. Each telling and proving conclusively of the wonderful performance of the new Stromberg Carburetors. Read the reports:

Jeffery Six

In an official test this car, which with five passengers, weighed 4100 pounds, equipped with a new Stromberg Carburetor, made the remarkable record of 28.7 miles on 1 gal. of gasoline, or 58.8 ton miles.



Overland 80

Carrying five passengers, total weight 3930 lbs., this car equipped with a new Stromberg carburetor in an official A. A. A. test, with 1 gallon of gasoline, went 29 miles or 56.9 ton miles.

Speed With Marmon Model 41

The wonderful speed test made on the Marmon Model 41 at Indianapolis was made possible by the fact that the car was Stromberg equipped. During this test the car, with top and wind-shield up, carrying five passengers, made the remarkable record of 62.89 miles in sixty minutes on Gasoline.

**Record
Climbing Hill
Test
Haynes Light
Six**

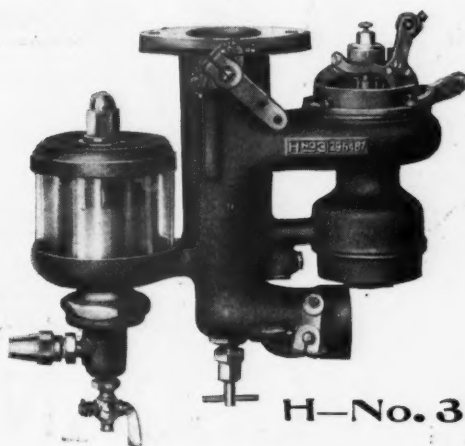
Demand More of Your New Car

You have no idea what a difference the equipping of your car with a new STROMBERG CARBURETOR will make. It will produce a great saving in your gasoline bills, for you will get more and better miles for each gallon you use. This carburetor will insure you a quick get-a-way giving you all the power that any one can desire without sacrificing in the least any of the other requisites of a perfect instrument.

All these tests were made when the temperature was low—in cold weather—under most unfavorable conditions. They indicate what one of the new Stromberg Carburetors will do on your car.

Haynes Light Six

Equipped with a new model Stromberg demonstrated its power in the Pittsburgh hill district. It climbed hills on high without overheating. With car and passengers weighing 4390 lbs. running from 2 M. P. H. in high gear it was speeded up to 42 M. P. H. in 200 feet.



H-No. 3

Cole Touring Car

Four cylinder stock car carrying seven passengers which with the car weighing 4390 lbs. and being equipped with a new Stromberg Carburetor, traveled 24.135 miles on one gallon of gasoline. In thirty minutes speed tests this car averaged 55.63 miles per hour.

**See This Wonderful Carburetor at Grand Central Palace,
New York, Auto Show January 2nd to 9th, 1915**

We'll have a full display of the new Stromberg Models at the New York Auto Show—to be held in the Grand Central Palace from January 2nd to 9th, 1915. Drop in and we'll tell you which Model Stromberg will get most out of your car. If you don't come to the Show, send for literature.

Stromberg Motor Devices Co.

64-66-68 East 25th Street
CHICAGO, ILL.

**Record Speed Test
in 62.8 Miles
Constant Running
Marmion Small Six**

**Record Test
Economy
28 1/2 Miles on One
Gallon of Gasoline
58.8 Ton Miles
Jeffery Six**

The WINTON SIX approves



WE are pleased to announce
that the seal of approval has
been placed on

THE VULCAN ELECTRIC GEAR SHIFT

by one of the most conservative manufacturers of motor cars in the United States—

The Winton Motor Car Co., Cleveland, O.

It can now be had on a Winton Six, as extra equipment, at an additional charge of \$150. The closed car is essentially a woman's car. Many women would drive their own Sedan or Coupe were it not for the difficulty experienced in shifting gears.

The Vulcan Electric Gear Shift eliminates this disadvantage and makes the Big Six as easy to control as the simplest Electric.

the Vulcan Electric Gear Shift

WE have from time to time advanced broad claims relative to the merits of the Vulcan Electric Gear Shift. We do not ask the public to accept our recommendations at their face value—on the contrary we, with the utmost confidence, refer to the Engineering Department of the Winton Motor Car Company, whose leadership in automobile engineering has been demonstrated by the successful pioneering of many of the most important developments in the automobile field.

The Vulcan Electric Gear Shift

supplies the final touch in the refinement of the modern gasoline motor car.

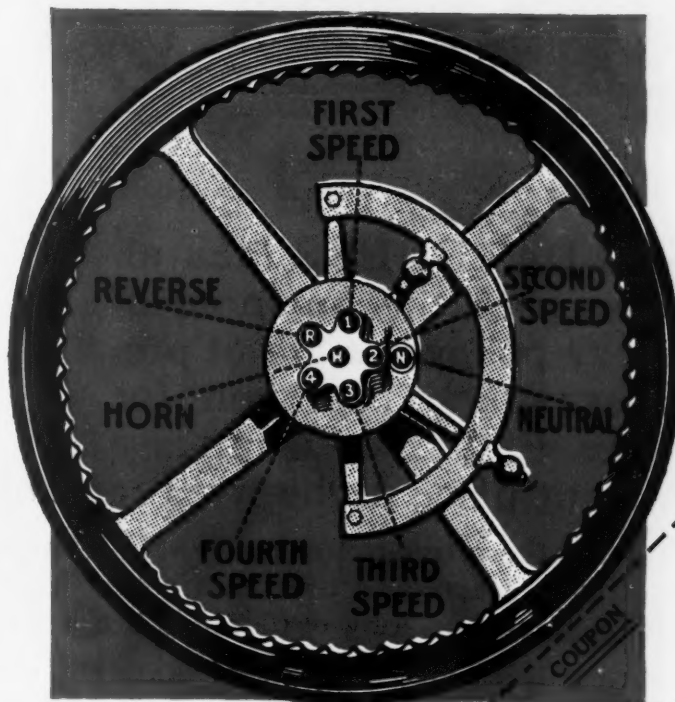
It is in effect a simplification, not a complication.

Its dependability has been proved.

Its cost is trifling.

Its usefulness is self-evident.

Winton owners and other differentiating motorists will be interested in our forty-eight page book, "Gear Shifting by Electricity," which explains and describes in detail this latest refinement and simplification of control. Copy gladly furnished on request.



M. A.

Please send me your book, "Gear Shifting by Electricity."

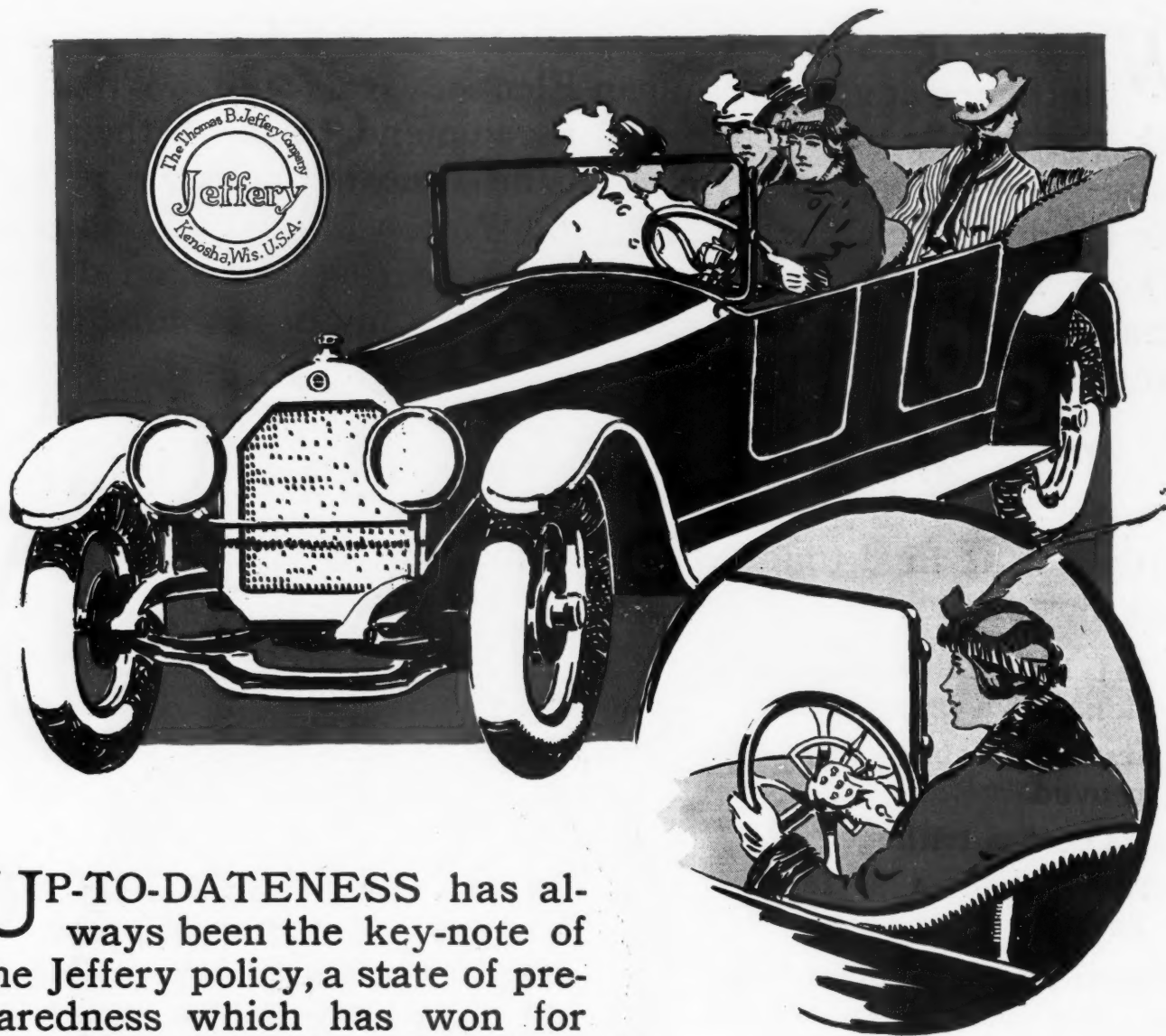
Vulcan Electric Gear Shift Dept.

Cutler-Hammer Mfg. Co., Milwaukee, Wis.

Name

Address

JEFFERY "SIX-48" approves



UP-TO-DATENESS has always been the key-note of the Jeffery policy, a state of preparedness which has won for The Thos. B. Jeffery Company a prominent place in the front rank of automobile manufacturers.

It has enabled them to employ many vital improvements long before other manufacturers had even started to investigate the merits of those same improvements. Constant research and long experience breed a keen discrimination.

We, therefore, with justifiable pride make the announcement that after pains-taking investigation THE THOS. B. JEFFERY COMPANY has adopted

THE VULCAN ELECTRIC GEAR SHIFT

as special equipment on the Jeffery Six-48 at an additional list price of \$150.

Vulcan Electric Gear Shift

THE advantages of the Vulcan Electric Gear Shift are limited only by the extent to which the car so equipped is used. The adaptability of the electric gear shift is not confined solely to the higher priced cars, as its first cost is well within the reach of any one who can afford to own a medium-priced car.

Two months ago we announced our booklet, "Gear Shifting by Electricity", and since then our offices have been deluged by demands for copies. A second and a third edition were necessary to supply the demand and nearly every automobile owner who has received a copy and has read it has become a Vulcan Electric Gear Shift booster.

Space limitation prevents our detailing the advantages of the electric gear shift, but *if the only advantage were the possibility of pre-selection, the electric gear shift would be well worth its first cost.*

Take a big, powerful car through crowded traffic or up a steep, twisting hillside road and learn why.

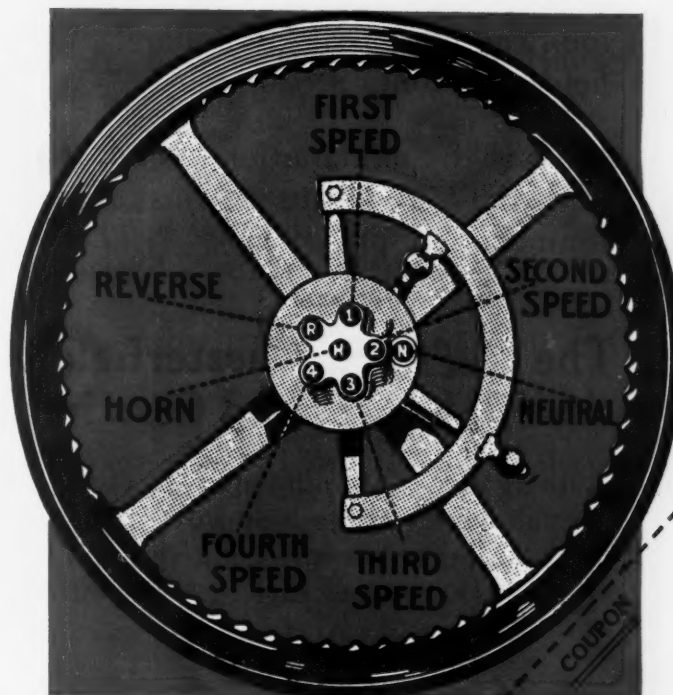
Ask your wife, sister or best girl why she does not drive and does not care to learn. Nine times out of ten the answer is the trouble of gear shifting.

The Vulcan Electric Gear Shift

has no complicated parts, no delicate mechanism. It is as easily operated as the electric horn.

It dispenses entirely with gear shifting levers and makes the big gasoline car as easy to operate as an electric.

It is clearly described in terms easily understood by a person having no knowledge of electrical machinery in our "Gear Shifting by Electricity", which will be sent free upon request.

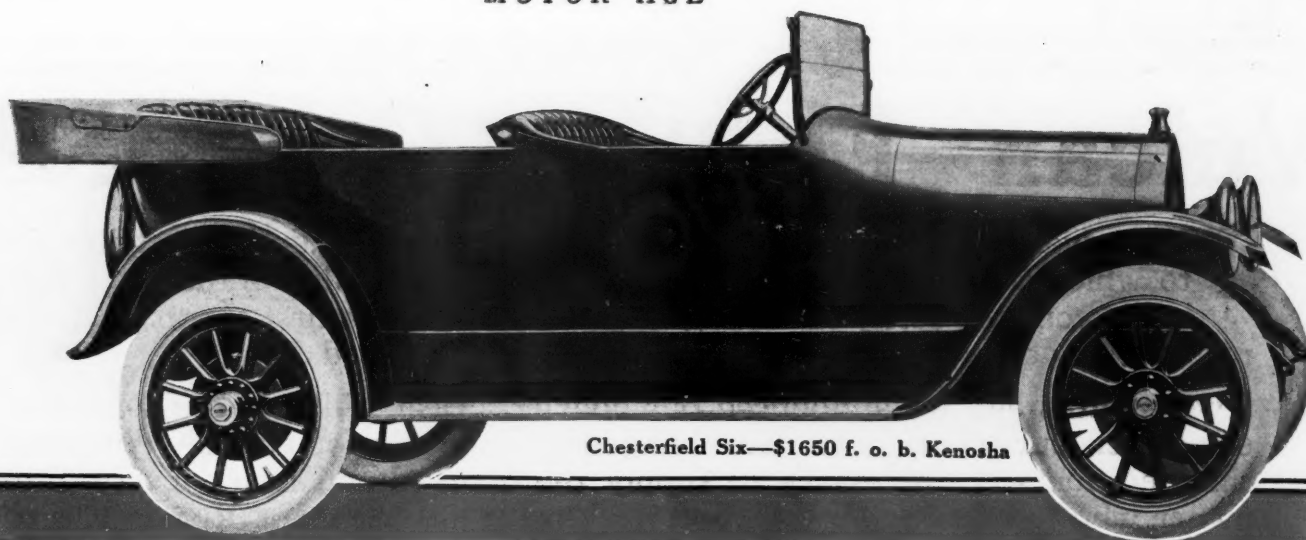


Vulcan Electric Gear Shift Dept.
Cutler-Hammer Mfg. Co., Milwaukee

Please send me your book, "Gear Shifting by Electricity."

Name

Address



Chesterfield Six—\$1650 f. o. b. Kenosha

Judge the Jeffery Specifications

A man well posted in motor car values reads through the list of **Jeffery** Chesterfield Six specifications—the price remaining unknown to him—he unhesitatingly classed the **Jeffery** with cars selling at four and five thousand dollars. Yet the price of the **Jeffery** Chesterfield Six is only \$1650.

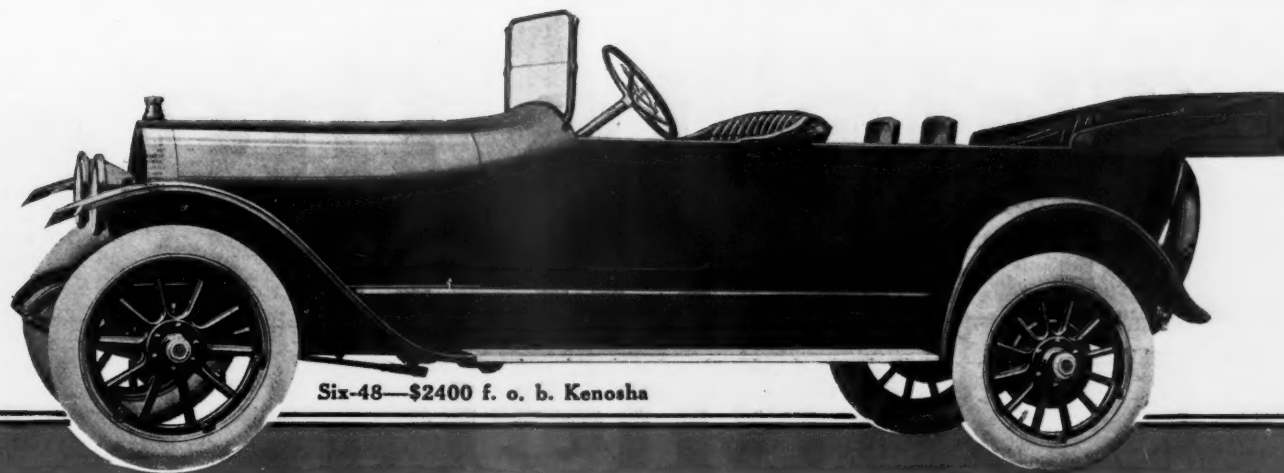
Here is the explanation. The **Jeffery** Chesterfield Six is not built with the idea of putting just a little better quality into it than is to be found in low priced cars. It is not built to compete with other cars in its price class.

The Jeffery Chesterfield Six is built to compete with the Highest Priced Cars in the World.

With that idea in mind the accepted and most successful practices of engineers here and abroad have been sorted and sifted in order that the **Jeffery** Chesterfield Six might be representative of all that has been approved in the construction of the higher priced cars of two continents.



See the complete line of **Jeffery** Cars at the Shows, New York, Grand Central Palace, Space A31, or at Chicago, Coliseum, Space C3.



Chesterfield Six by its —Not its Price

The **Jeffery** Chesterfield Six is equipped with the Bijur Starting and Lighting System, in use by the foremost cars of the world. It is the only American car in its price class with a 4-speed transmission. Its worm drive is the type used exclusively on the finest electrics, the finest trucks and the best foreign cars, but, with no important exceptions, on no American pleasure car. Its finish—requiring 22 distinct operations—is without a superior even among the highest priced cars.

The **Jeffery** Chesterfield Six has a high speed, high efficiency motor, and Tungsten steel valves, costing five times more than cast iron valves in general use. It is equipped with the Daimler leather coupling, used only by the highest priced American and European cars. It has Spicer universal joints, conceded to be the best made. The speedometer is Empico-driven—the most costly practice.

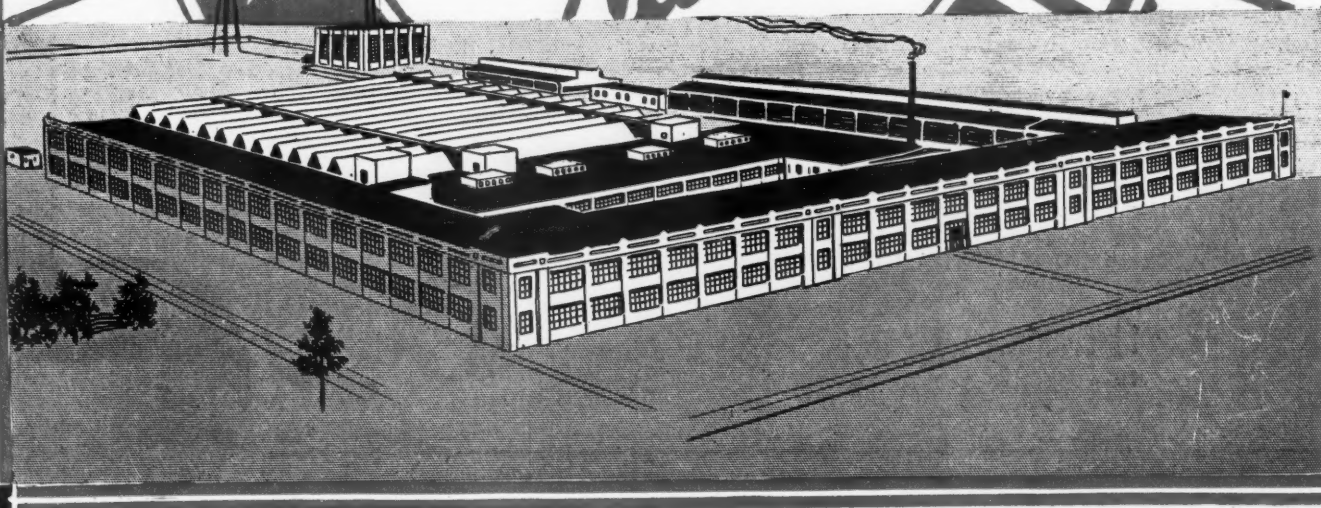
Other quality features of **Jeffery** construction are: 3-plate dry disc clutch—imported annular ball bearings throughout—Bosch ignition throughout—New Model Stromberg carburetor—cantilever springs—Stewart vacuum gasoline feed—Waltham clock—Solar headlights (five intensities)—Klaxet horn, Collins curtains, Neverleek One-Man top and other up-to-date equipment.

DEALERS: **Jeffery** Cars at their price offer the greatest opportunity in the field. See us at the Shows.

The Thomas B. Jeffery Company
Main Office and Works, Kenosha, Wisconsin



This is the Day of the Continental



When Writing to Advertisers, Please Mention Motor Age.

123 manufacturers have seen the light; 123 leading makes of motor cars—pleasure and commercial—now take their motion from the Continental Motor; 123—where a year ago there were 60!

Such a growth is profoundly significant. It marks a positive conviction that Continental Certainty is now fundamental in the structure of motor cars whose makers are striving hardest to reach the goal of perfection.

Continental Motors

It marks the final establishment of a definite quality basis in manufacturing—assuring a permanent market for the maker, and a permanent guarantee of goodness for the owner.

The trend toward this standardization has been slow but steady. For twelve years Continental Motors have been leading the way.

Scores of makers knew the overwhelming advantages of a Standard Motor, from both the production and the sales standpoint. They only awaited the right motor, a motor of known quality and national reputation.

Now they have it in the Continental—have a motor proved by time, endorsed by more than a hundred thousand drivers, known favorably to every dealer in the land.

This is the reason for the landslide Continental-ward.

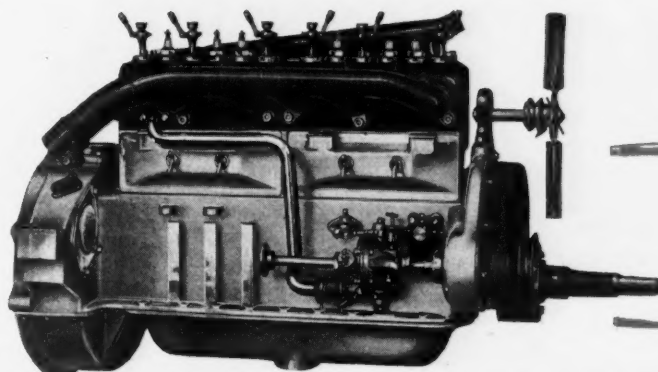
For the manufacturer who today builds into his product a Continental Motor, builds in also an added prestige that carries tremendous advantage for maker, dealer and owner.

This is the day of the Continental—broad sunlight of well-earned reputation, shining into every nook and corner of motordom.

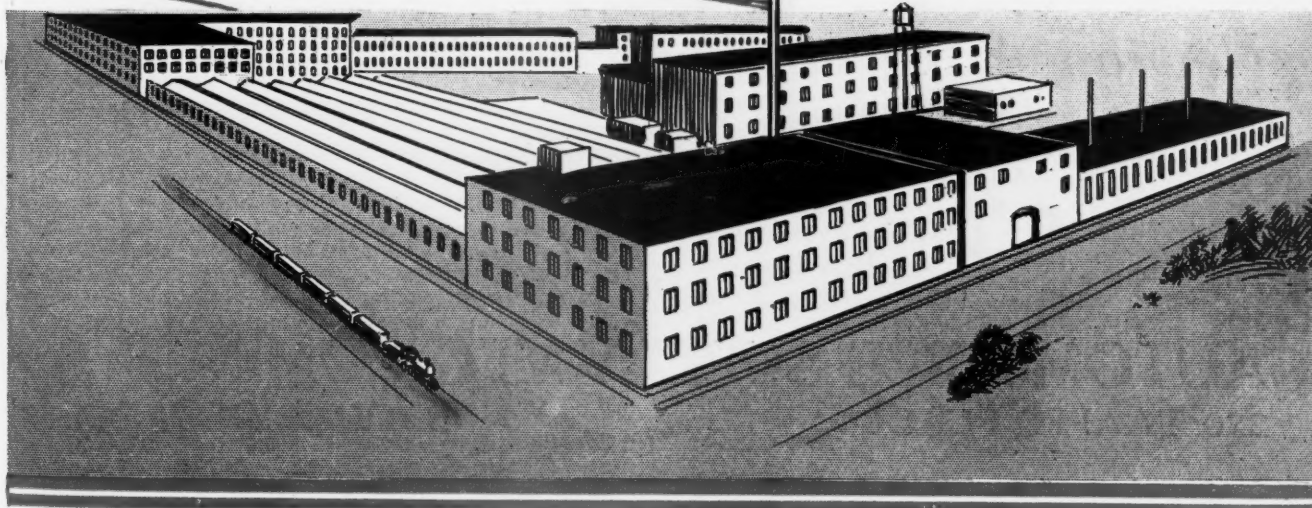
Get into the flood of light. Get your place in the sun.

Continental Motor Mfg. Co., Detroit, Mich.

Largest exclusive motor builders in the world
Factories, Detroit and Muskegon



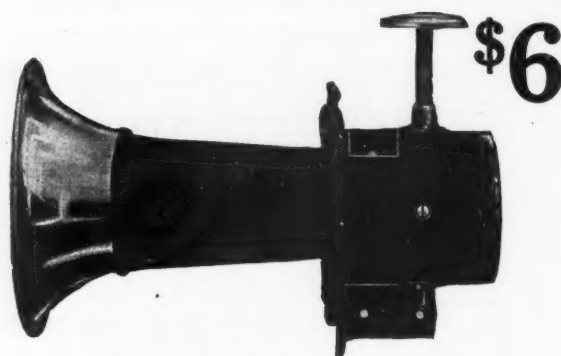
See Our Exhibit at Space 39, Coliseum Gallery,
Chicago Automobile Show



The Horn That Speaks For Itself

THE *Handphone* hand-operated horn has established an enviable reputation for efficiency, durability and power. It is mechanically perfect, easy to operate—the slightest touch of the lever gives an instantaneous loud, deep, penetrating warning.

Convince yourself of the merits of any horn before you buy—compare the Handphone with any other mechanical horn and the difference will be instantly apparent.



The Handphone

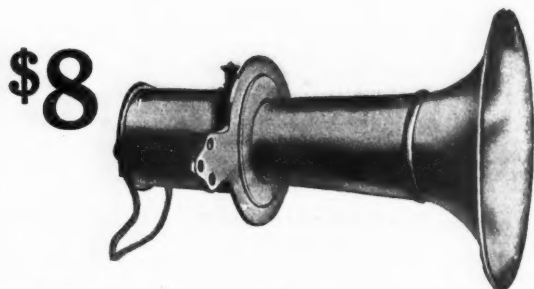
**Guaranteed for
Three Years**

**All We Ask Is A Fair
Comparison of Values**



Handphone Type C

Has the same mechanical construction as the larger horn.



Newtone Superior

**The Best Motor-Driven
Horn At Any Price**

We believe The *Newtone Superior* to be the most perfect motor-driven horn on the market. It has a wonderful volume of sound with a minimum current consumption, an average battery lasting six months.

Compare it with other horns of similar type and size, selling at anywhere within double the price and judge for yourself.

**Write or telegraph at our expense for
the Best Dealers Proposition Made**

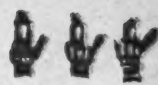
AUTOMOBILE SUPPLY MFG. COMPANY

220 TAAFFE PLACE

See Us At The Shows

BROOKLYN, N. Y.

Eliminate winter worry



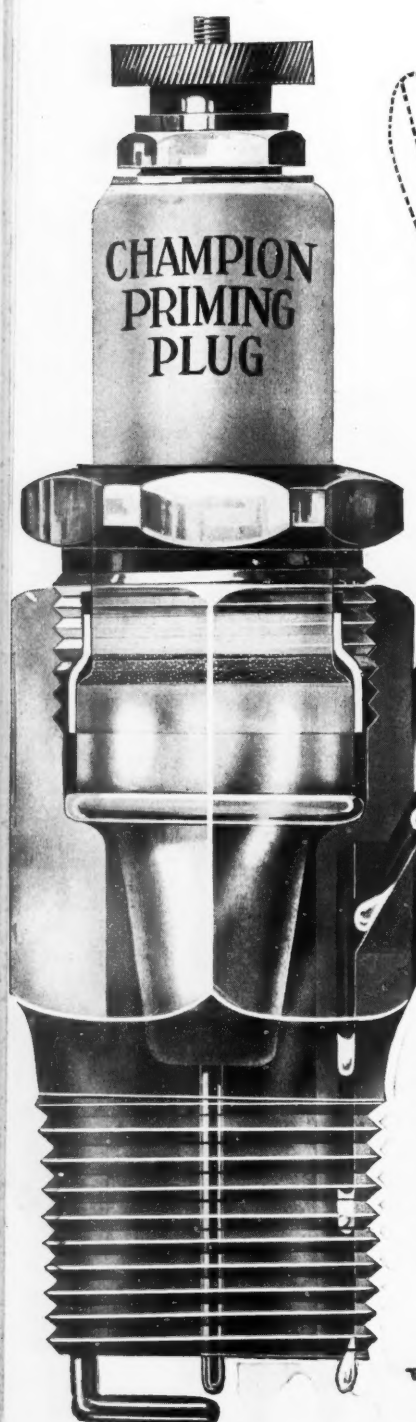
with

"CHAMPION SURE START PRIMING PLUGS



THE CHAMPION PRIMING VITALIZES COLD MO

Start Your Motor on the First Quarter Turn



An important new feature on the 1915 Champion Priming Plug. A key lock is supplied with each plug, right on the needle valve—always in place, ready for use.

With this key lock it is the simplest thing in the world to open the needle valve, prime, and then close the valve so tightly that there is absolutely no chance for loss of compression.

Opening in needle valve for inserting oil can nozzle.

Key lock attached to needle valve to quickly open and close needle valve.

New steel needle valve hardened and ground to a perfect compression-tight seat.

Open needle valve, turning slightly by hand, and gasoline you inject will flow down through its own channel to plug base. Vaporization occurs directly past igniting points. Explosion will result every time on first turn of starting crank, regardless of cold weather.

Gasoline channel in spark plug shell.

Champion Priming Plugs are not an experiment. They are not a freakish idea, placed upon the market one year, and then—never again. Champion Priming Plugs have been on the market for the past four years. They have been a success from the start.

Champion Priming Plugs are built with the same care and manufacturing methods which are used in the manufacture of all Champion Plugs. In fact, the Champion Priming Plug is simply a tried and proven Champion Spark Plug which has the additional feature of a truly efficient priming device.

HOW TO OPERATE. Simply turn the needle valve in the Champion Priming Plug, inject a few drops of gasoline which flows directly to the sparking point. Tighten the valve. Touch the starting button, or give a pull on the crank and "away she goes." You don't even have to remove your gloves, or use a wrench. The key lock on the needle valve makes this unnecessary.

CAUTION. Beware of all Petcock type priming plugs with leaky petcocks.

TOLEDO MADE FOR THE

ING CUP PLUG MOTORS



A Few Cold Weather Don'ts

DON'T crank your head off

DON'T exhaust your storage batteries trying to start.

DON'T laboriously remove spark plugs in order to prime your motor.

DON'T depend on petcocks in your motor. Gasoline must be brought direct to the sparking points.

DON'T send for mechanic to start your car.

DON'T be towed home on account of inability to start.

DON'T forget when you are buying a set of priming plugs that you still want ignition. Insist upon the CHAMPION Priming Plug, the only plug made with a needle attachment for priming. Easiest to operate. Needle valve never opens from vibration. Absolutely no possibility of loss of compression.

CHAMPION Priming Plugs are made by the largest manufacturers of spark plugs in the world, the makers of CHAMPION Spark Plugs, which are the factory equipment of over 75 per cent. of all the automobiles made in this country. Here is made every piece that enters into the construction of CHAMPION Spark Plugs—every nut, every center wire, every bushing, every shell, every gasket, every part is carefully wrought from the raw material. Even our porcelain cores are made in our own porcelain factory.

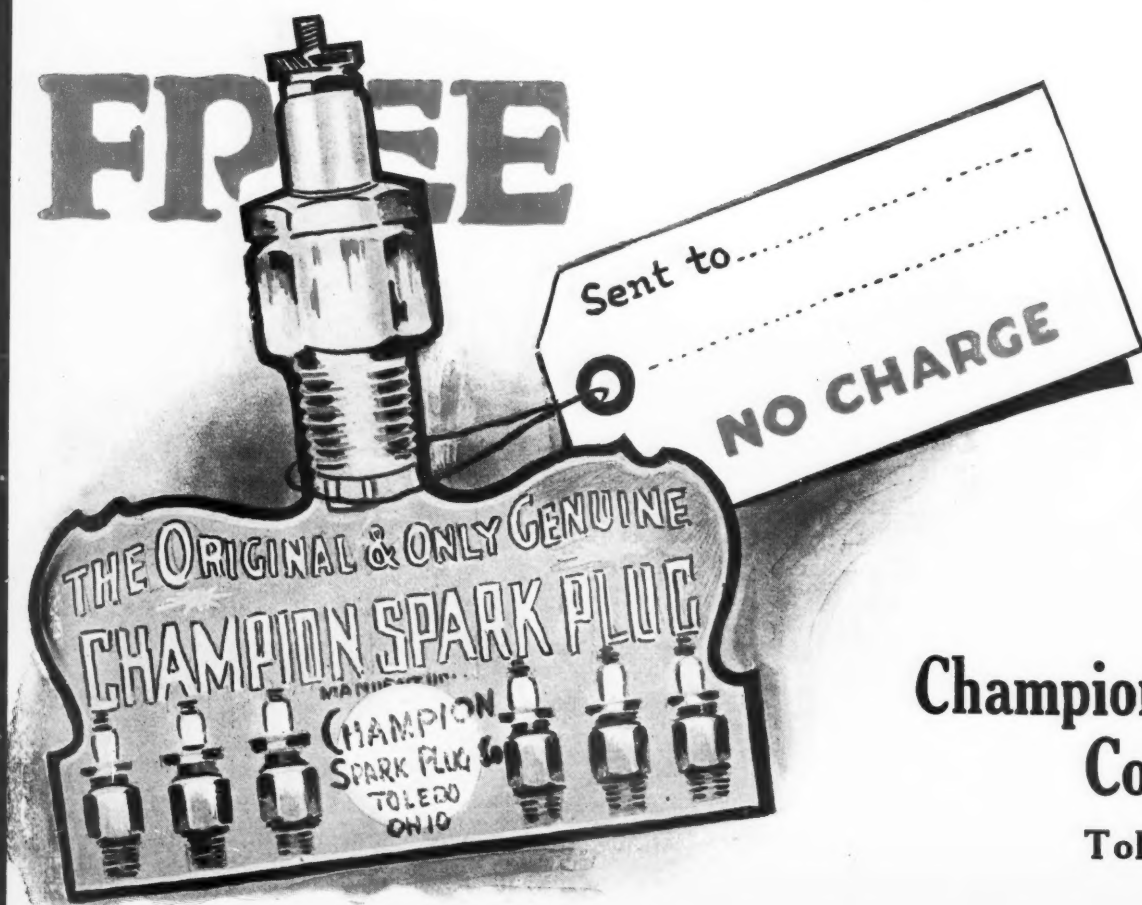
STRONGEST GUARANTEE EVER MADE: Complete satisfaction to the user, or free replacement, repair, or your money back.

Insist upon CHAMPION—the needle valve type of Priming Plug. Made in all sizes to fit any motor.

W H O L E W O R L D ' S T R A D E

A REAL CHRISTMAS GIFT TO THE DEALER

THIS attractive display card, with CHAMPION Plugs attached, we will send free to any dealer ordering through his jobber 100 CHAMPION Plugs in a shipment. You should take advantage of this special offer at once. Order through your jobber and request him to forward the display card direct from our main office, Toledo, Ohio.



**Champion Spark Plug
Company**
Toledo, Ohio

"TOLEDO MADE FOR THE WHOLE WORLD'S TRADE"



National
SIX
\$2375

THIS is the
Reason why
National Deal-
ers stick to this
Line of Cars!

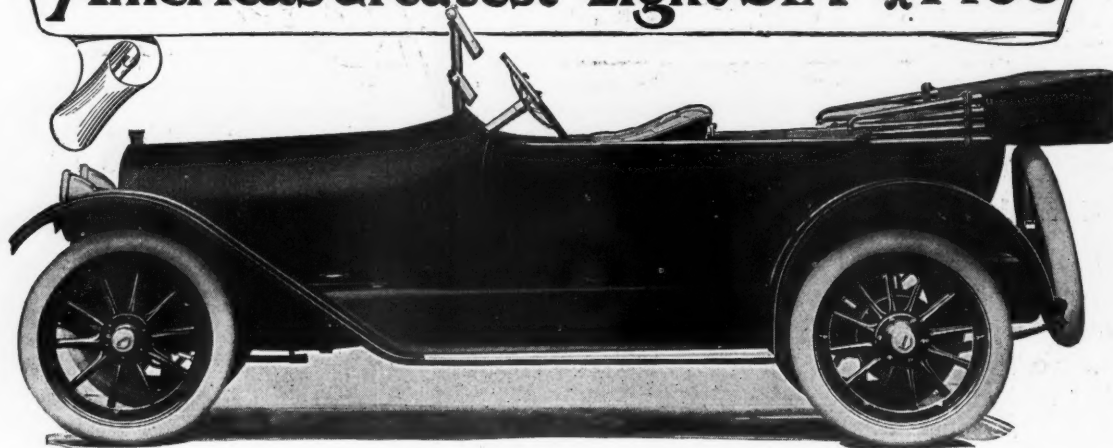


National Motor Vehicle Co., Indianapolis, Ind.

*The result of
22 years' successful
experience in
building motor cars*



America's Greatest "Light Six" \$1485



THE
HAYNES
America's Greatest "Light Six"

Conceded generally as the best car
of its type in America today, will
be exhibited at the New York and
Chicago Automobile Shows.

Three Body Styles

Model 30, America's Greatest
"Light Six" Five Passenger
Touring Car, 121" Wheelbase,
Weight 2950 lbs - - - - \$1485

Model 30, The Prettiest Roadster
in America - - - - - \$1485

Model 30, The Haynes "All-
Weather" Cabriolet - - - \$1750

In Addition We Offer Model 33

THE KOKOMO "SIX"

a brand new seven-passenger touring car. This model is similar to our Model 30, America's Greatest "Light Six," with the exception that it has six inches more wheelbase, a seven-passenger body, 35x4½" tires, and weighs 3050 lbs.

This model will likewise be exhibited at the leading automobile shows and the price will be announced January second at the opening of the New York Show. Deliveries February first.

Detailed specifications and full information concerning unoccupied territory upon request.

This coupon for the convenience of intending automobile purchasers.

The Haynes Automobile Co.

2 S. Main Street
Kokomo Indiana

The
Haynes
Automobile
Company
2 S. Main St.,
Kokomo, Indiana

Please send me your
catalog describing Amer-
ica's Greatest "Light Six."

Name

Address

I expect to buy a car about

**NEW YORK
SHOW
EXTRA!**

Inter-State BULLETIN

**Extra Value
for
\$1,000**

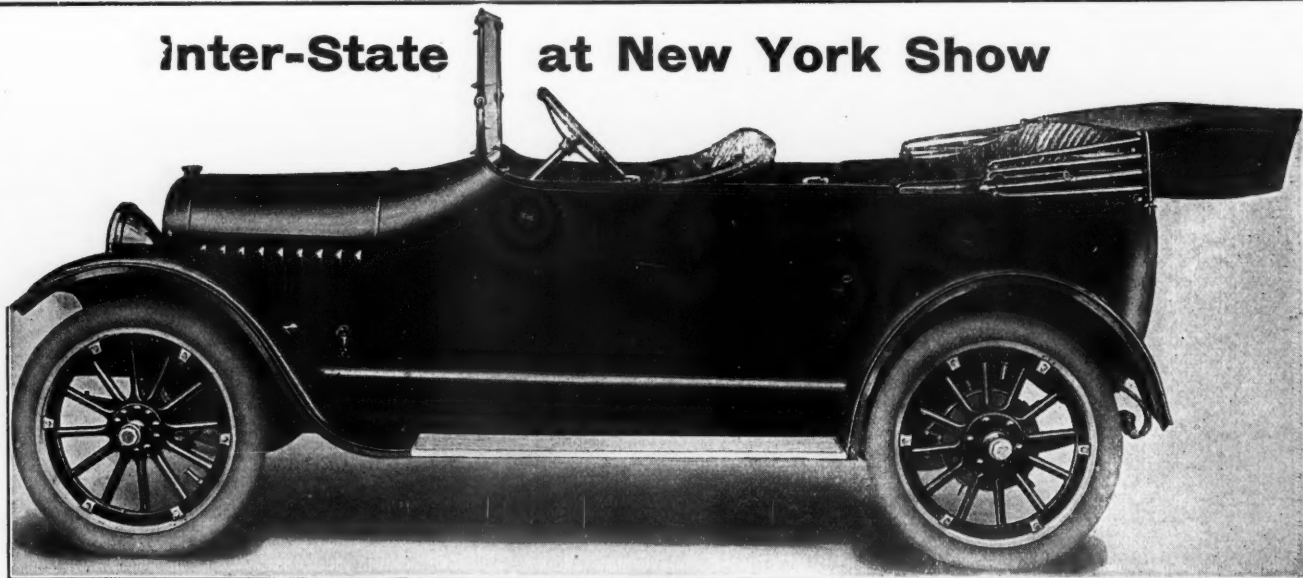
Volume I.

MUNCIE, INDIANA,

DECEMBER 31, 1914

Bulletin 6.

Inter-State at New York Show



Thousand Dollar Car Makes Debut at Grand Central Palace

BIGGER PROFIT FOR THE DEALER

Handling the Inter-State Assures a Prosperous Season for the Man Who Appreciates a Quality Car.

The Inter-State "Four" is the one popular priced car with the biggest selling arguments in the country.

To the live, hustling dealer this means a car easy to sell, built by a company which believes in co-operation with the agent and buyer.

A ride in the Inter-State is a convincing argument to the buyer, because the value is seen and appreciated at a glance.

The manufacturing methods, the buying power and the organization of this company, enables them to offer dealers a proposition that means a money making season.

They have put forth every conceivable effort to make the co-operation between the dealer and themselves harmonious and beneficial.

This company has no schemes or "sky-rocket" policies, simply business of the straightforward variety, which in the end makes money for the dealer and insures perfect satisfaction for the buyer.

A Personal Message From B. W. Twyman, Gen'l Mgr.

"In making your selection this year, of the car you will represent, there is no other popular priced car in the world today that offers you as many honest selling features as the Inter-State "Four."

"Our car has been designed and built with the buyer constantly in mind."

"Our one aim and policy has been to give the buyer a car that represents a quality car at a medium price."

"As proof of this, remember—this new Inter-State in every essential and detail of construction has been designed by a man who is a salesman as well as a designer."

"His long experience and contact with the buyer has made him familiar with the little things that influence sales."

"In designing every detail of this car this man has held the buyer up before him, and left nothing undone to make the Inter-State a practical car for the most critical buyer to own."

"If you want a car free from the 'drag' of selling, you will investigate our car further."

"Make it a point to visit us at the New York Show or write us today for further particulars and our territorial agreement."

B. W. Twyman

POPULAR NEW CAR AT PALACE SHOW

Thousand Dollar Car Will Be In Charge of Factory Experts to Explain Merits of New Product.

The new Inter-State "Four" manufactured by the Inter-State Motor Company of Muncie, Indiana, a popular priced four cylinder model, listing at \$1,000, fully equipped, will be on display at the New York show.

The exhibit promises to be an interesting one to dealer and buyer alike, as this new car has many novel features of design and workmanship. It is the company's intention to exhibit also sectional parts of the car, and a polished chassis so that the visiting public can see the car in detail.

B. W. Twyman, general manager of the company, together with a large number of salesmen, will be in charge of the Inter-State display to receive visiting dealers and buyers.

"C-5"
FIRST REGIMENT
ARMORY
CHICAGO SHOW
LIVE DEALERS
WILL SEE THIS
WONDERFUL CAR
THERE.

Inter-State BULLETIN

NEW YORK
SHOW
EXTRA!

Volume I.

MUNCIE, INDIANA,

DECEMBER 31, 1914

Bulletin 6.

CASH DOWN—BEST BUYING ARGUMENT

Bigger Values and Better Service Are
Assured the Buyer.

Means a Good Margin in Price for
the Dealer Who Has Been Hamp-
ered in the Past.

In any business institution, whether
it be automobile or dry goods, the best
buying argument in the world is
backed by the "Cash Down" policy.

Any concern that is backed finan-
cially to such a point that they can al-
ways pay cash for everything they buy,
can build more quality into their prod-
uct because they will be buying bet-
ter materials at a less cost.

The "Cash Down" policy is strictly
adhered to by the Inter-State Motor
Company in building the new Inter-
State "Four."

This company is financed in such a
way that *every* piece of material that
enters into the construction of this
popular priced car is *paid* for with
cash.

This buying power is not a move on
the part of this company to hypnotize
the manufacturer of goods at the out-
set, but will be used constantly.

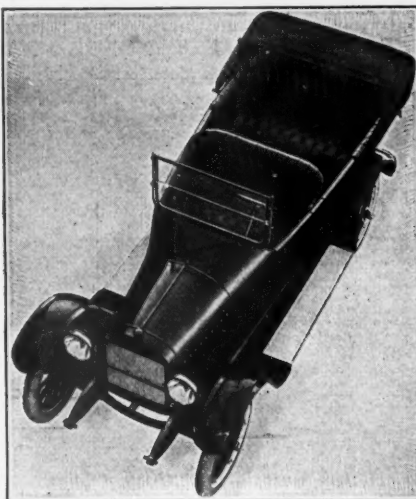
To the purchaser of the Inter-State,
it means bigger and better values for
his money. It allows the company to
institute a service to owners that is
both agreeable and profitable to the
dealer and owner alike.

The car you can buy from the
Inter-State builders represents a qual-
ity that under any other conditions
would cost the buyer one-third to one-
half more.

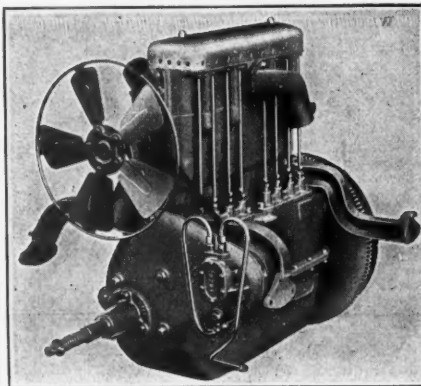
With the right kind of factory or-
ganization, low over-head and the
"cash down" policy of buying the new
Inter-State for dealer or buyer alike,
bears your worthy investigation.

The energetic dealers of the country
who appreciate business prosperity,
and the value of representing a sound,
sane company, will thoroughly investi-
gate the new Inter-State. The New
York show affords a good opportunity
to study this car.

Birds-eye view showing the room
and comfort in the New
Inter-State



The body of the new Inter-State
"Four" is very roomy and comfortable.
It represents a departure in the build-
ing of a popular priced car. No
cramping or crowding—simply com-
fort and enjoyment for all five pas-
sengers.



The above illustration shows the
overhead valve motor of the Inter-
State "Four." The cylinders are of
the split-head type, making the valves
and pistons easily accessible. Every
part of the motor has been designed
to give easy access to every working
part. The Inter-State motor has a
reputation for power and economical
operation under the most trying cir-
cumstances.

EDITORIAL

More Power—More Comfort—And
More for The Money.

In nearly every medium priced car
today you will find there is one par-
ticular feature that makes this car
popular.

In one it will be power—in another
it will be comfort—and in still an-
other it is beauty or an appeal to the
buyer of "more for the money."

But how often, in the popular priced
car do you find all of these *three* re-
quisites in any one car?

It was our aim in building the Inter-
State, to give you all of these funda-
mentals of quality.

Proof of our claims of power, com-
fort, and beauty is in the car we offer
you today.

Dealers who have found that sales
have been curtailed because of a lack
of power, or comfort, or beauty of
finish and design, will find their
troubles in sales making over in this
new Inter-State.

By actual performance and compari-
son our car *has* more power and *more*
comfort and *more* beauty.

It is a remarkable fact that every
dealer who was connected with the
former makers of the big Inter-State
is now handling this new product.
This new car in no way conflicts with
the design of the old cars. Every-
thing in it is new.

They realize, as you will, that this
new Inter-State is a car of worth, and
any one of these dealers that you may
choose to visit, will tell you why he
finds the Inter-State company a good
one to deal with. We will gladly fur-
nish you the names of any of our deal-
ers upon inquiry from you.

Our Space At The
New York Show is "B7"

We have a territorial plan that will
interest you if you are a progressive
dealer.

If you do not come to the show
write us today for our proposition.

INTER-STATE MOTOR CO.
802 W. Williard St., Muncie, Ind.

MERCER

THE PRIDE OF AMERICA

Performances speak more than words. Compare the records below, and judge Mercer merit for yourself.

THE WORLD'S GREATEST ROAD RACES (From MoToR's Historical Chart)

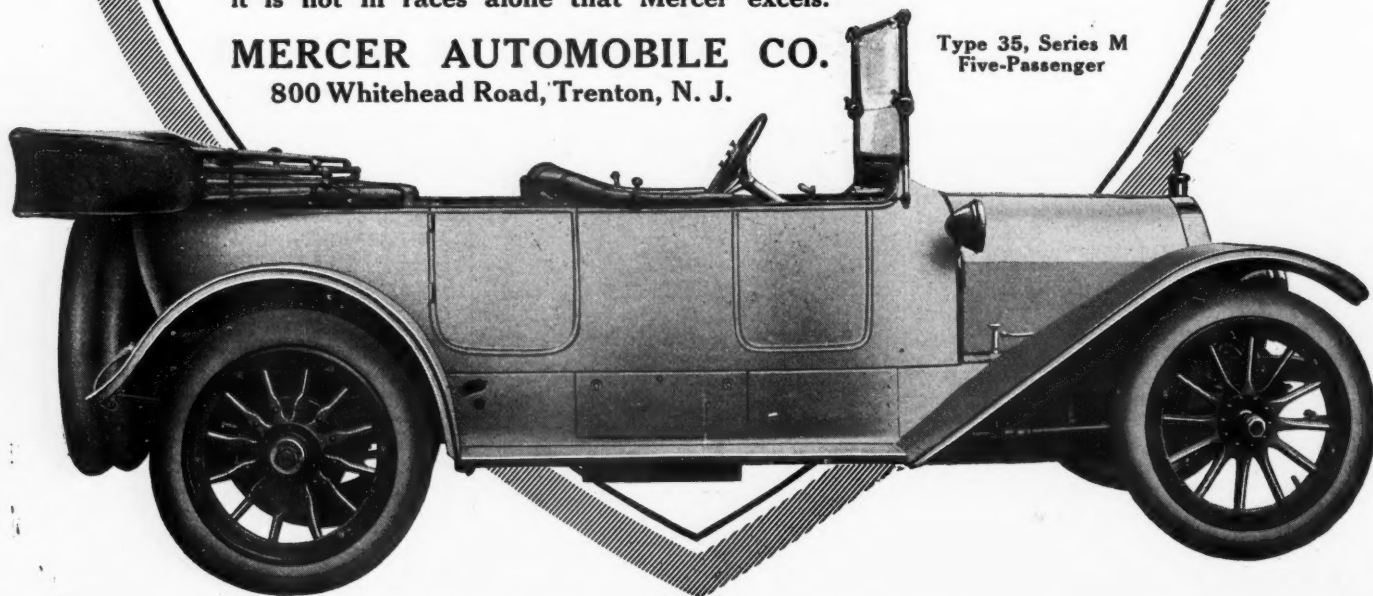
				Showing Average Speed of Winners																AVERAGE SPEED M. P. H.
DATE	RACE	DISTANCE	DRIVER	CAR	35	40	45	50	55	60	65	70	75	80	85	90				
1904	Vanderbilt Cup	284.4 miles	Heath	Panhard														52.25		
1905	Vanderbilt Cup	283.3 miles	Hemery	Darracq														52.18		
1906	Vanderbilt Cup	297.1 miles	Wagner	Darracq														61.43		
1906	Grand Prix (France)	619.08 miles	Szisz	Renault														62.75		
1907	Grand Prix (France)	769.88 km.	Nazzaro	Fiat														70.6		
1908	Vanderbilt Cup	258 miles	Robertson	Locomobile														64.3		
1908	Grand Prix (America)	402.08 miles	Wagner	Fiat														65.1		
1908	Grand Prix (France)	769.88 km.	Lautenschlager	Mercedes														69		
1908	Florida Cup	518 km.	Nazzaro	Fiat														74.15		
1909	Fairmount Park	200 miles	Robertson	Simplex														55		
1909	Vanderbilt Cup	278.08 miles	Grant	Alco														62.77		
1910	Elgin	305.03 miles	Mulford	Lozier														62.5		
1910	Vanderbilt Cup	278.88 miles	Grant	Alco														65.18		
1910	Fairmount Park	202.5 miles	Zeng's	Chadwick														59.9		
1910	Grand Prix (America)	415.2 miles	Bruce-Brown	Benz														70.55		
1910	Santa Monica	202.08 miles	Tetzlaff	Lozier														71.3		
1911	Grand Prix (France)	405 miles	Hemery	Fiat														57		
1911	Elgin	305.26 miles	Zengle	National														60.42		
1911	Elgin (Stack 300 Cu. In.)	170 miles	Hughes	Mercer														64.81		
1911	Fairmount Park	202 miles	Bergdoll	Benz														61.25		
1911	Fairmount Park (300 Cu. In. Div.)	202 miles	Hughes	Mercer														58		
1911	Grand Prix (America)	411.36 miles	Bruce-Brown	Fiat														74.45		
1911	Vanderbilt	291.38 miles	Mulford	Lozier														74.07		
1911	Santa Monica	202 miles	Herrick	National														74.93		
1911	Savannah Trophy	222.82 miles	Hughes	Mercer														80.26		
1912	Santa Monica	303.012 miles	Tetzlaff	Fiat														78.5		
1912	Santa Monica (300 Cu. In. Div.)	150.506 miles	De Palma	Mercer														69.54		
1912	Elgin	305.94 miles	De Palma	Mercedes														68.9		
1912	Elgin (Aurora Trophy)	305.04 miles	Hughes	Mercer														65.05		
1912	Grand Prix (France)	956.8 miles	Boillot	Peugeot														68.45		
1912	Coupe de la Sarthe	402.1 miles	Goux	Peugeot														72.7		
1912	Tacoma (300 Cu. In. Div.)	150 miles	Pullen	Mercer														58.1		
1912	Grand Prix (America)	409.9 miles	Brigg	Fiat														68.4		
1912	Vanderbilt	299.54 miles	De Palma	Mercedes														68.97		
1913	Grand Prix (France)	569.68 miles	Boillot	Peugeot														72.43		
1913	Le Mans Grand Prix	336 miles	Bablot	Delage														76.8		
1913	Santa Monica	445.2 miles	Cooper	Stutz														73.77		
1913	Elgin	301.68 miles	Anderson	Stutz														71.55		
1913	Elgin (300 Cu. In. Div.)	301.68 miles	De Palma	Mercer														68.8		
1913	Corona	301.81 miles	Cooper	Stutz														74.43		
1914	Vanderbilt Cup	294.035 miles	De Palma	Mercedes														75.6		
1914	Grand Prix (America)	403.248 miles	Pullen	Mercer														77.22		
1914	Grand Prix (France)	467.6 miles	Lautenschlager	Mercedes														65.5		
1914	Elgin	301.04 miles	De Palma	Mercedes														73.53		
1914	CORONA	301 MILES	PULLEN	MERCER														87.76		

Visit our exhibit at the New York, Chicago, and other Automobile Shows. You will find it is not in races alone that Mercer excels.

MERCER AUTOMOBILE CO.

800 Whitehead Road, Trenton, N. J.

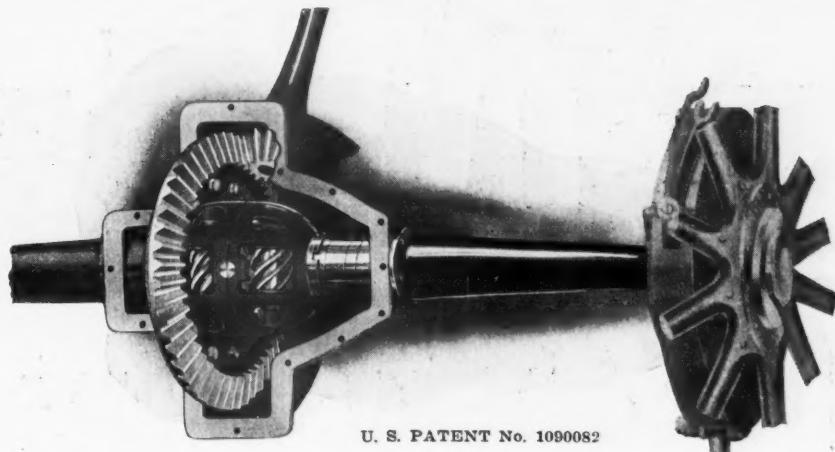
Type 35, Series M
Five-Passenger



America's Greatest Gear Factory Makes the "M & S" DIFFERENTIAL

STOPS THE
SKID BEFORE
IT STARTS.

INTRODUCES
SAFETY TO
THE AUTO-
MOBILE.



U. S. PATENT No. 1090082

Europe
wanted trucks
with a differ-
ential lock.
The M & S
does all that
a lock will do,
& a great deal
more as well.

The Brown-Lipe-Chapin Co. of Syracuse, the largest makers of Differential Gears, have contracted for the American manufacturing rights of the M & S and can now supply sample gears to car manufacturers' own specifications.

Jeffery Adopts "M & S"

The "Jeffery Quad" used by the U. S. Army and selected for use in Europe is equipped with M. & S. Differentials. Eight big manufacturers are now making exhaustive tests with a view to equipping their cars with this new improved Differential which gives an entirely new conception of rear axle efficiency. Some car makers are already satisfied and have closed contracts for next year.

"M & S" Gives Equal Pull on Both Rear Wheels

This means that you can make shorter turns—that you save wear on tires and add from 500 to 1,500 miles to their life. That you get more mileage per gallon of gasoline—that all the power of your motor is used for driving the car instead of some of it being lost, as it is by the old style differential.

Your Rear Wheels Can't Spin

You can get out of mud holes, sand or snow if one wheel has even the slightest traction. Your engine can pull greater loads with less strain—your car runs smoother and more evenly and the danger of skidding on slippery streets or in mud is largely done away with.

See the "M & S" Differential at Shows—At the Exhibit of the Brown-Lipe-Chapin Co.

Learn the secret of the new mechanical principle demonstrated by the "M. & S." which has caused engineers and manufacturers to marvel at the results given by this wonderful new differential. Absolute proof will be given that the "M. & S." Differential will do even more than we claim.

A Special Type "M & S" for Ford Cars

In order to give Ford owners an opportunity to increase the efficiency of their cars and to provide for Ford differential replacements a special type M & S has been designed for the Ford car.

Any mechanic can install it in a few hours. The cost is only a trifle more than the regular Ford bevel gear differential. But the advantages are so evident that no Ford owner will be satisfied with his present differential when once he has driven a Ford equipped with the M & S.

Dealers in Ford parts and accessories can get particulars regarding territory, prices and approximate delivery dates by writing the M & S Gear Co., 1528 Grand Avenue, Kansas City. Order for your Ford now.

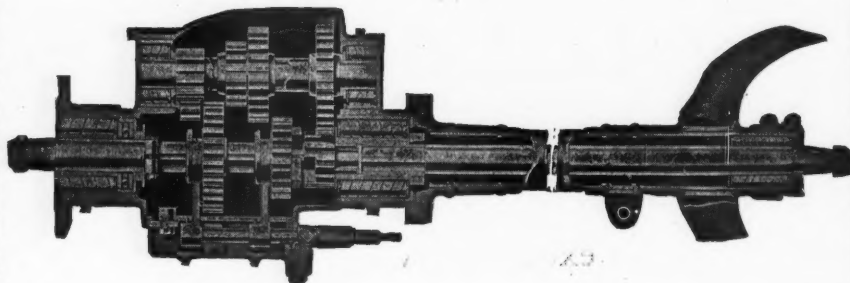
If you don't go to New York write for further particulars and literature

For particulars regarding the M & S as
standard equipment for pleasure cars and trucks
BROWN-LIPE-CHAPIN COMPANY
SYRACUSE, NEW YORK

For Ford agency arrangements on the M
& S replacement proposition write
THE M & S GEAR COMPANY
KANSAS CITY, MISSOURI

COVERT

TRANSMISSIONS



COVERT TRANSMISSIONS are the choice of those who make quality the chief consideration. This quality is the result of a specialization in this field, a completeness of equipment and organization, and the creation and maintenance of a standard that is satisfied with nothing less than the best.

The inevitable result has been a product that has taken front rank in efficiency, strength, silence and durability and which is found in ever-increasing quantities in both pleasure cars and trucks of the better class.

We shall be glad to place our knowledge and experience at your command and have our engineers co-operate with you in adapting COVERT TRANSMISSIONS to your product.

COVERT MOTOR VEHICLE CO.

Sales Office: Detroit, Mich.

Factory: Lockport, N. Y.

Every Dealer Who Wants To Make More Money
Should See The New

Auburn

AT THE AUTO SHOW

FIX in your mind now to see the new Auburn cars at the Auto Show if you can't before then. But don't expect anything freakish or any experimental mechanical theories. Expect good looking, sound-to-the-core motor cars with all modern comforts and conveniences and you won't be disappointed.

The low prices of the new Auburns attract and their performance convinces. And remember, back of the new Auburn car is a solid, reliable concern that has kept faith with dealers and owners for fourteen years.

Personal attention of Auburn executives will be given your inquiry.

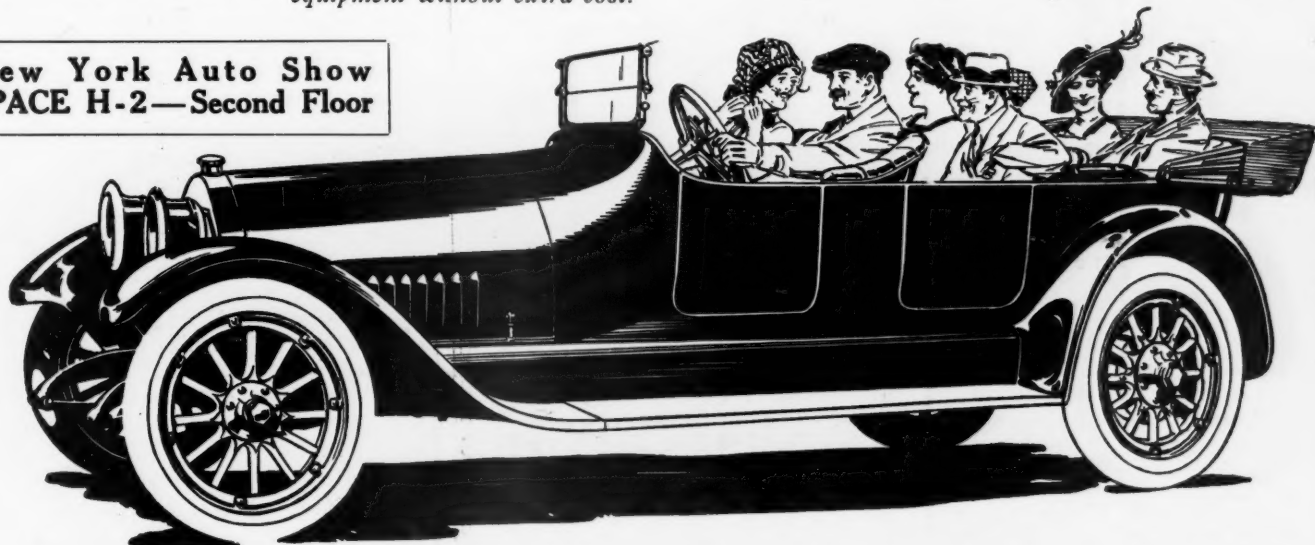
A Few Features of the 1915 Auburn Cars:

Powerful motor, either Four or Six cylinders, cast en bloc—Electric starter—electric lights—stream line bodies—access to all four doors—instrument board in cowl dash—tonneau longer and wider—seats larger and upholstery deeper—windshield, electric horn, and simple and convenient one man top with boot—left side drive and center control—Crown fenders—jump-spark ignition—gear driven, centrifugal pump, water cooling—wheelbase, 126 inches for Six, 114 for Four—springs, semi-elliptic front, $\frac{3}{4}$ elliptic rear—demountable rims; tires, 34x4 for Six, 32x4 for Four—complete equipment without extra cost.

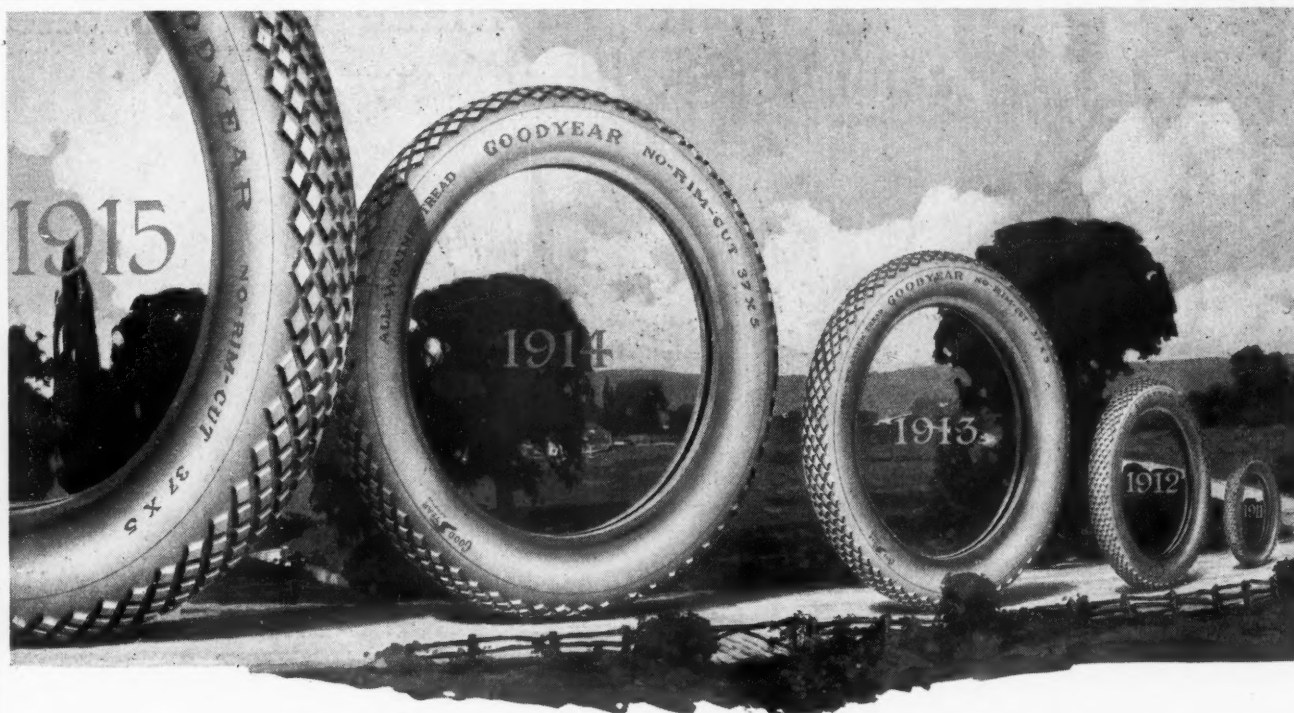
FOUR
\$1075

SIX
\$1550

New York Auto Show
SPACE H-2—Second Floor



Auburn Automobile Company, Auburn, Indiana



Note How Goodyear Grows As the Years Roll By

1,479,883 Tires Last Year

In the fiscal year just ended we sold 1,479,883 Goodyear pneumatic automobile tires. That's about one tire for every car in use.

It was 26.6 per cent more tires than we sold the year before. It was half as many tires as we had sold in our previous 14 years combined.

It was more per month than we sold per year back in 1909.

It is more than were sold of any other tire that's built.

To Men Like You

We sold these tires to men like you—men who seek quality tires. To men who want safety, strength and endurance. To men who watch tires and compare them.

Some had accidents with tires. Some misused and wrecked them. And some, no doubt, got faulty Goodyear tires.

But there's the record after 15 years—after mil-

lions of tests and comparisons. The final verdict, as shown by sales, is that Goodyear tires are best.

Fortified Tires

Five Exclusive Ways

Goodyear Fortified tires protect you in five exclusive ways.

One combats rim-cutting in the most efficient way that's known.

One means safety. These tires are held on by an unstretchable tire base, in which we vulcanize six flat bands of 126 braided wires.

One saves needless blow-outs. Our "On-Air" cure—which costs \$1,500 daily—prevents the countless blow-outs due to wrinkled fabric.

One—a patent method—reduces by 60 per cent the risk of tread separation.

And one combats punctures and skidding. That's our All-Weather tread—tough and double-thick, flat and smooth-running, sharp-edged and resistless.

All these features are in Goodyear Fortified tires. Not one of them is found in any other.

Let Them Prove

This isn't written to sell tires, for tires must sell themselves. We simply urge you to test the tires which won this matchless showing.

They outsell any other. They are gaining new users fast. They are fortified in exclusive ways against five major tire troubles.

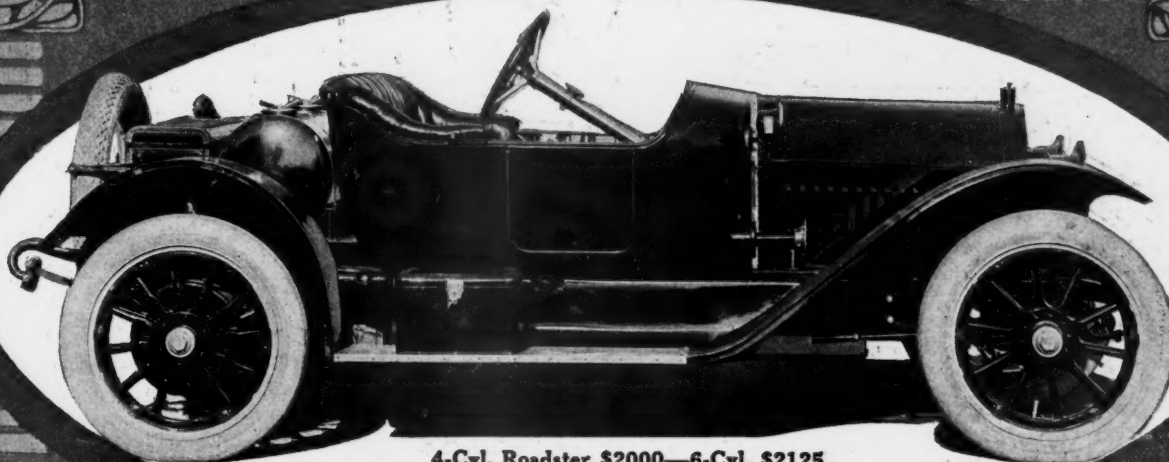
You cannot, we argue, be fair to yourself without proving out these tires. And now, with the new year, is a good time to do it.

Any dealer will supply you if you say you want Goodyear tires.



THE GOODYEAR TIRE & RUBBER COMPANY, AKRON, OHIO

(2040)



4-Cyl. Roadster \$2000—6-Cyl. \$2125



Favorite of Every Motorist with the Blood of a True Sportsman in his Veins

A car which for gameness, bull-dog pluck and unfaltering consistency of performance in competition with the picked cars of the world, has won the admiration of the motorists of two Continents.

The Ranking American Car

America's Road Race Champion by virtue of the fact that it has won more road races since their inception than any other American car. Winner of the recent Los Angeles-Phoenix 696-mile desert road race.

See this Record-Breaking Line at the New York Show, January 2 to 9, Grand Central Palace, 2d Floor, Space B 10, and at Chicago Show, January 23 to 30, at Coliseum Annex, Space P 1

The Stutz Complete Line

4-CYLINDER MODELS

\$1475 H. C. S.	\$2250 Bulldog
\$2000 Bearcat	\$2275 Touring
\$2000 Roadster	\$3675 Sedan

6-CYLINDER MODELS

\$2125 Bearcat	\$2400 Touring
\$2125 Roadster	\$3800 Sedan

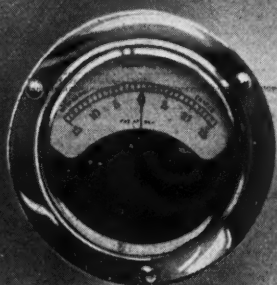
WRITE FOR CATALOG

DEALERS:—*It will pay you to investigate the STUTZ line before closing contracts*

Stutz Motor Car Co., Indianapolis, Ind.

Agencies in All Principal Cities

APELCO



AMMETER

APELCO electric starting and lighting outfits—both single and double unit systems—are strong features of the 1915 season. While simplicity has been kept foremost in APELCO products, construction in every detail is such as to withstand the most severe test of automobile service.

In combining the motor and dynamo into one unit as practiced on *Mitchell*, *Briscoe* and other cars, not only compactness is secured, but a design lending itself to an easy application to the automobile engine. Acting as a motor, the machine has sufficient power to *spin* the engine at a good rate of speed. As a generator it has capacity to keep the battery fully charged, insuring ample current for starting, lights, ignition, horn, etc.

In the two unit APELCO system, motor and starting switch form the one and generator and timer distributor the second unit. An important feature embodied in the generator unit is the method in which the generator and the driving bracket are connected. The complete generator can be removed for any care or attention without disturbing the ignition system. The drive from engine is by a combination of spiral gears that insures noiseless running. The starting motor in combination with the starting switch is small and compact, automatic in action and positive in practice.

The entire self-controlling mechanism of the new LIGHTING GENERATOR is contained within its housing and but one pair of wires need be run from the generator to the battery. The movable element is independent of dashpots, liquids, frictional devices, pivots, oil, grease, graphite and shocks on the road.

In both single and two-unit APELCO systems, the Indicating Automatic Switch is mounted in the circuit between dynamo and battery. Its function is to make connection between these two units when the voltage of the dynamo exceeds that of the battery as well as break connection when the battery voltage exceeds that of the dynamo.

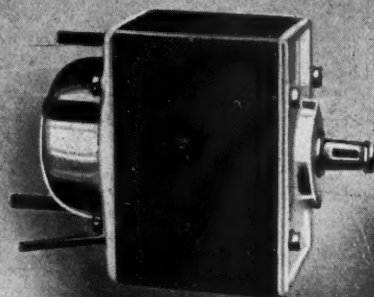
The AMMETER is a new comer, designed particularly for automobile service and creates special interest by reason of the fact that violent jarring, due to vibrations of the dash board, cannot affect it as regards accuracy and mechanical stability. Here again reliability and efficiency are the keynotes.

Study our exhibits:

New York Show: Space C, 60-73
Chicago Show: Space 59

THE APPLE ELECTRIC COMPANY
NEWARK, N. J.

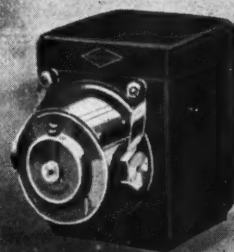
(All APELCO features are fully covered
by patent or patents pending)



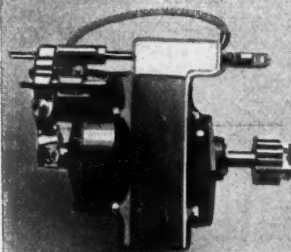
MOTOR
AND
DYNAMO
IN ONE UNIT



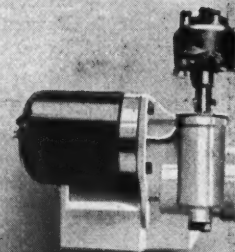
AUTOMATIC
SWITCH



LIGHTING
GENERATOR



MOTOR
AND
STARTING
SWITCH



GENERATOR
AND
TIMER
DISTRIBUTOR

Follow the Buying Crowd to the **NEW OAKLAND** At Automobile Shows Everywhere

See the New Oakland—*You'll want to drive it.*

Drive the New Oakland—*You'll want to own it.*



The 1915 New Oakland is fully a year in advance as to Power, Light Weight, Strength and Design.

The New Oakland Dealer has the edge on all other dealers.

**Fours
and
Sixes
\$1100
to
\$1685**

F. O. B. Pontiac, Mich.

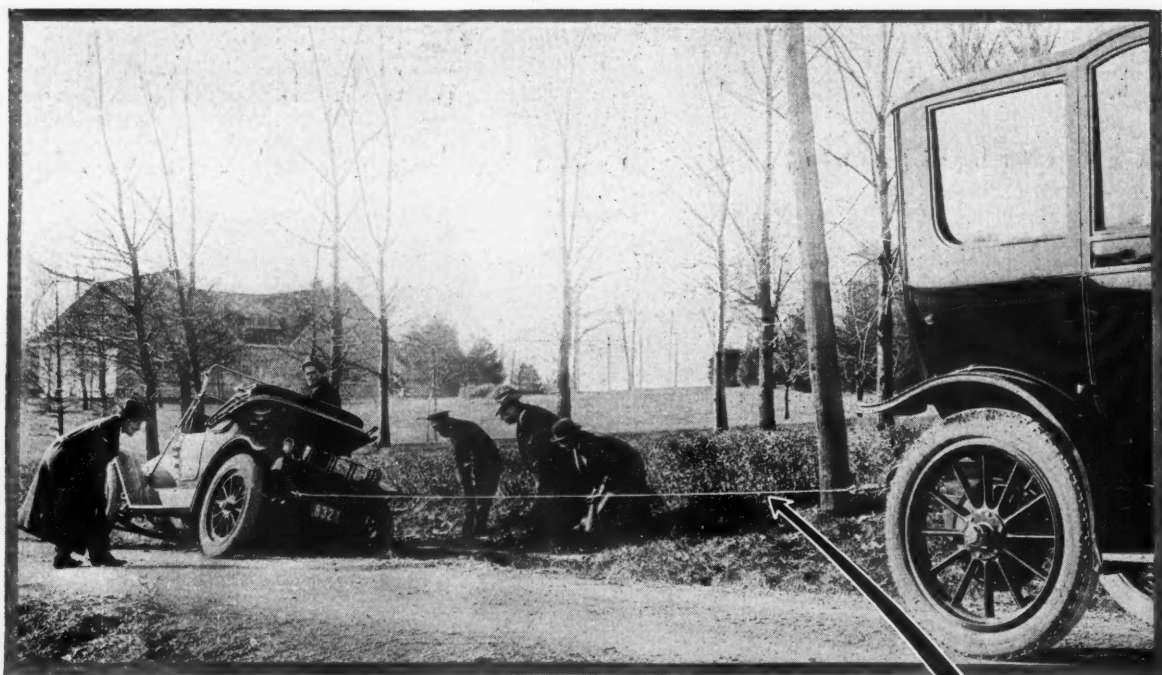


Light Weight with Great Strength.
High Speed Motor with Great Power.
Low Center of Gravity, with usual Road Clearance.
Racing Car Lines, assuring Minimum Wind Resistance.

DEALERS Investigate the New Oakland contract. It's fair, square and profitable.

OAKLAND MOTOR CO., PONTIAC, MICH. Branches and Distributors in All Principal Cities

When Writing to Advertisers, Please Mention Motor Age



Autowline on the Job

THIS actually happened near St. Louis, Mo. The roadster ran into the ditch, just off the famously-good "Clayton Road." A Good Samaritan came along in his Limousine. He had a Basline Autowline under his driver's seat, ready for just such an emergency. In a few minutes the roadster was back on the road—its owner was saved a long wait, as well as a bill for a team of mules. It is needless to add that he bought an Autowline the next day.

Basline Autowline

"The Little Steel Rope With The Big Pull"

You need it in winter driving as well as in summer touring. You never know when or where you may get into road trouble. This safe, sure steel line is about 25 feet of famous Yellow Strand Powersteel wire rope. It weighs only 4½ pounds, but it can pull a 4,000-pound car up a 20% grade. You don't know it's in your car until you need it—then it always does its work. Attached instantly by snaffle hooks. Two manila slings prevent marring or scratching the paint. At your dealer's; \$3.95 east of the Rockies.

TRUCK AUTOWLINE, a grown up brother of Basline Autowline, is ideal for heavy towing. You need one on every truck. \$5 F. O. B. St. Louis.

AUTOWLOCK locks car wheel to spring or spare tire to rack. At your dealer's, \$2 east and \$2.25 west of the Rockies.

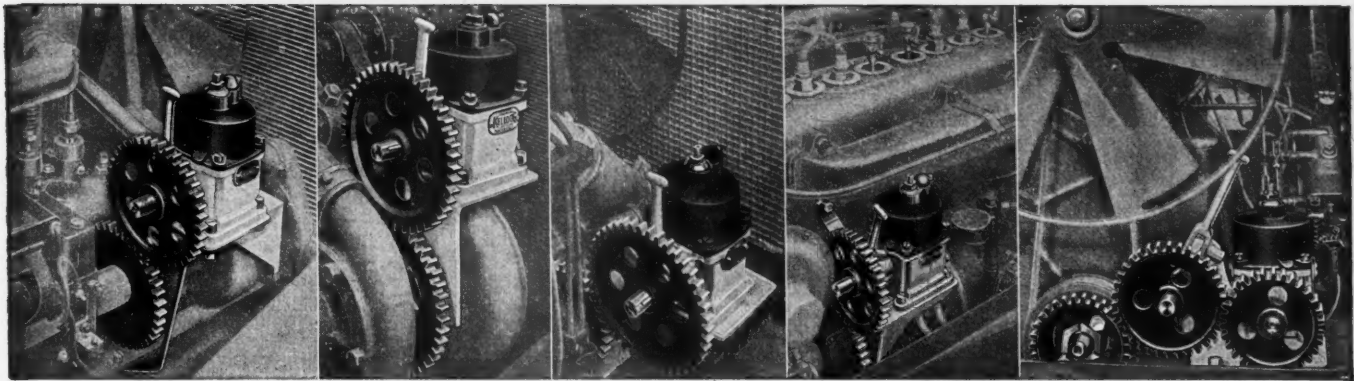
FREE Write today for the fully illustrated Autowline circular

Broderick & Bascom Rope Co.

Manufacturers of Yellow Strand Powersteel Wire Rope
813 North 2d Street
St. Louis, Mo.

New York Office
76-E Warren St.





Reo the 5th

Buick 36 and 37 Model

Overland 80 and 81

Studebaker 4 Cylinder

Hudson 6-40

These Attachments Insure a Superior Tire Pump

All through our six years' experience making tire pumps we have found that carefully fitted and carefully made attachments are an absolute necessity. A tire pump has come to be recognized as a *standard* accessory. This fact is in a large measure due to the satisfaction that the Kellogg pumps *with attachments* have been giving to over 60,000 automobile owners.

You need this pump on your car. Inflates tires in less than two minutes. A great convenience either *en tour* or for town work. Saves its cost in saving tires.

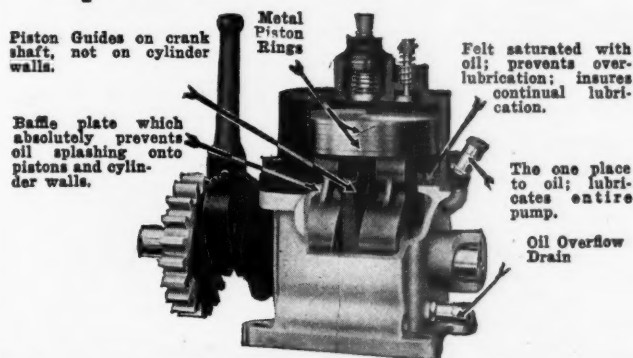
**Only
\$15**

COMPLETE WITH AIR
HOSE, AIR GAUGE AND
ATTACHMENTS CARE-
FULLY FITTED FOR EASY
INSTALLATION ON YOUR
CAR.

**Engine Driven
KELLOGG
Tire Pump**

All Metal No. 101

This pump is made as carefully as the best automobile engine. The drop forgings, the bronze parts and cylinder iron are of superior quality. All workmanship is of the highest standard. There are two metal piston rings instead of one. This pump is made to become a permanent part of a good power plant. Oiling system is unique and highly efficient.



Note the "Everlasting Construction"

**We Guarantee Absolutely
No Oil Spray With the Air**

We are prepared to furnish this pump complete with attachments for the following cars:

Abbott-Detroit	Case	Fiat	Imperial	Lexington	Olds	Simplex	Velie
American	Chalmers	Flanders	Jackson	Marmon	Overland	Singer	Westcott
Buda Motors	Chandler	Franklin	Jeffery	Maxwell	Packard	Speedwell	
Buick	Cole	Haynes	King	Moon	Paige-Detroit	Stearns	
Cadillac	Davis	Hudson	Kissel	National	Patterson	Studebaker	
Cartercar	Elkhart	Hupmobile	Krit	Oakland	Reo	Stutz	

**To the
Trade**

*This coupon is designed for owners' use.
You can use it without enclosing money.
Let us tell you what we do with the \$15
checks from owners.*

Orders taken care of promptly at main office or at branches at

BOSTON

DETROIT

NEW YORK

CHICAGO

SAN FRANCISCO

Distributors Everywhere

New York Show, Space C-115; Chicago Show, Space 25

KELLOGG MFG. CO. (114) Rochester, N. Y.
Gentlemen: Enclosed find \$15 (check, money order, draft) for which please send me one No. 101 Kellogg pump complete with air hose, air gauge, and attachments ready to install on my
Car Model Year
My Dealer's Name Address
My Name Address



All argument ends
with your first ride in

The Eight-Cylinder Cadillac

The new Cadillac with its V-type Eight-Cylinder Engine is proving an absorbing topic for engineers and experts as well as for the layman.

Technical arguments, vague and beclouded, can, of course be advanced for and against any and every type of engine ever produced.

But theoretical speculations in this instance are very short-lived.

There is slight encouragement to argue the pros and cons of a principle when that principle, in the first performance, removes the last, lingering doubt.

That is exactly what occurs in the case of everyone who rides in the Eight-Cylinder Cadillac.

All arguments end with the first ride—whether the observer be an engineer or a layman.

The man who rides in the Cadillac for the first time does not need to be told by a technical expert that its eight-cylinder engine is an impressive success.

He knows without being told.

There is no need to consult blueprints or text books.

He has only to consult his own feelings and sensations.

He recognizes the difference just as clearly as he would recognize the difference, for instance, between riding over the ground and riding in the air.

And compared with previous motor car experiences, riding in the Cadillac is very much like riding in the air.

It is not necessary to point out to him that the Cadillac Eight-Cylinder engine exhibits a new degree of flexibility.

That is perfectly apparent even to an amateur in motoring, in the extraordinary ease of acceleration and the astonishing extent to which the Cadillac travels without gear shifting.

He does not need to be told that the car is surpassingly smooth.

He *feels* it—precisely as he feels that hills seem to flatten out before this wonderful car.

The engineer can explain to the layman the why and the wherefore of these differences; but the layman can feel just as keenly as can the engineer, that a ride in this car is not like any ride either of them has ever taken.

It is the business of the scientific mind to withhold judgment until a principle has been proven.

But Cadillac owners have a pleasant habit of expressing complete confidence in Cadillac promises.

They are chiefly concerned to know *how much* and *how far* the Eight-Cylinder Cadillac will surpass all that has been said of it in our announcements.

And they have demonstrated the faith that is in them by placing advance orders to an extent which far surpasses all previous records.

That fine spirit of expectation will not be disappointed.

We repeat—for expert and layman, all theorizing will end with the first ride in the Eight-Cylinder Cadillac.

STYLES AND PRICES

Standard Seven passenger car, Five passenger car and Four passenger Salon \$1975. Roadster, \$1975.
Landaulet Coupe, \$2500. Five passenger Sedan, \$2800. Seven passenger
Limousine, \$3450. Prices F. O. B. Detroit.

Cadillac Motor Car Co. Detroit, Mich.

When Writing to Advertisers, Please Mention Motor Age.



Gibson Quality

**Accessories
Shop Equipment**

**Service
Treatment**

More Than a Name

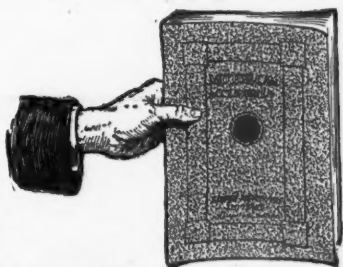
- it means doing things EXACTLY RIGHT.
- it means peace of mind for the dealer.
- it means a guarantee that goes beyond the manufacturer.
- it means QUALITY in every sense.
- it means service that is beyond criticism.
- it means that an accessory carrying this brand has been tried, proven and is the best that can be found in any market.

FIFTEEN YEARS

serving the Dealers in this line from Maine to California, from the Lakes to the Gulf, their loyalty to this house is reflected in our remarkable growth—all the result of a system of Fair Treatment, Quality Goods and Instant Service.

The Most Complete Stock of Motor Car Accessories and Shop Equipment in America—Insures you IMMEDIATE shipment on every requirement.

We are General Sales Agents for FALCON TIRES AND FALCON INNER TUBES, the HIGHEST QUALITY Tire Products obtainable. A proposition every Dealer should have—it is a money maker and a trade builder. SEND FOR DETAILS AND CONTRACT.



In preparation—the Gibson 1915 Catalog. The authority on Automobile Accessories. A complete Dictionary of Supplies and Shop Equipment. It is for the Dealer ONLY. Ready for distribution about early in 1915. Edition is limited—get your request in early.

Place your accessory orders with GIBSON and be assured of

**Service,
Prices, Quality and
Fair Treatment**

Gibson Automobile Co.
320 North Capitol Boulevard
Indianapolis



WONDERFUL COLD WEATHER ABILITY

MORE STARTING POWER WITH
NON-STALLING EFFICIENCY

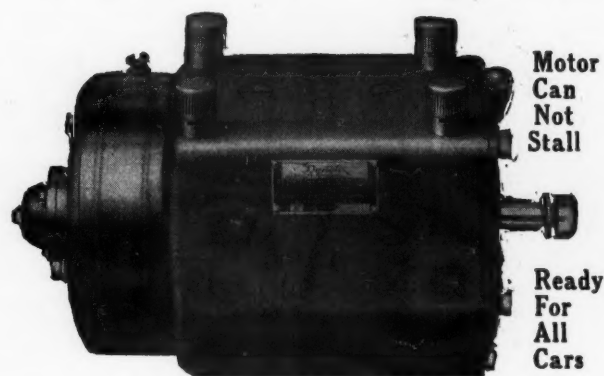
Single
Unit



Electric STARTING and LIGHTING System

COLD Weather Test

Recent test made in temperatures ranging from $7\frac{1}{2}^{\circ}$ below to 28° above zero gave perfect starts ad lib. without a failure. Then after purposely exhausting the battery and allowing only 40 seconds for recuperation, the Dyneto gave 22 consecutive starts at 10 second intervals.



Motor
Can
Not
Stall

Ready
For
All
Cars

Type B—45 lbs.

Notice Its Noiseless Efficiency on the FRANKLIN this Winter

This combination Motor-Generator changes automatically with change of speed. One simple switch. Motor cannot stall.

No Complications of Cutouts, Relays, Clutches or Gears

As a motor it is naturally more powerful than the smaller motor in a two-unit system; as a generator more efficient than the smaller generator of a two-unit system; and yet its weight is less than the combined two units.

Manufacturers: Size, weight, simplicity & manufacturing facilities enable us to make you an interesting proposition.

Dealers: Ask your manufacturer if he has ever considered how the Dyneto, as standard equipment, would help you sell cars.

Owners: Ask your car dealer to investigate the advantages to you in having the more dependable and efficient system on your car.

DYNETO ELECTRIC CO. Send us any electrical problems you have **Syracuse, N. Y.**



Polarine

FRICTION REDUCING MOTOR OIL

A CAR in commission all winter. No lapse of service through coldest weather if you use POLARINE.

Maintains the correct lubricating body at any speed or temperature. Liquid at zero. POLARINE obviates a host of winter troubles.

The result of fifty years' exclusive oil experience, master methods and equipment. When a better oil can be made we will make it.



RED CROWN
GASOLINE
Car and money
go farther

STANDARD OIL COMPANY
(AN INDIANA CORPORATION)



Living it over Again

In a mental picture, he reviews the accident—the result of his recklessness.

He realizes too late that it is *always foolhardy* to motor on slippery roads and streets without equipping *all four tires* with

Weed Anti-Skid Chains

The Only Real Safeguard Against Skidding

Strange, is it not, that *some men laugh at peril*—they do not seek to avoid danger—and they have no fear because they have no prudence.

They continue to motor over sleety, icy, or wet roads and pavements with "Foolish Dependence Upon Bare Rubber Alone" until a false turn—a sudden meeting at a corner—a slip or a skid—brings disaster as the punishment for their imprudence.

You motorists with reasoning brains put on your Tire Chains at the first

indication of slippery streets, and the editors of the daily newspapers are urging all motorists to follow your example.

For instance, the Public Ledger of Philadelphia, Pa., published by the owners of The Saturday Evening Post, in an editorial on August 1st, 1914, said that the simple adjuration to "*Use Tire Chains on wet and slippery pavements*" deserved to find its way into a law, and that law should by all means be enforced.

Promote "Safety First" in YOUR motoring circle—insist that everyone use Weed Chains on ALL tires.

Weed Chain Tire Grip Co., Bridgeport, Conn.

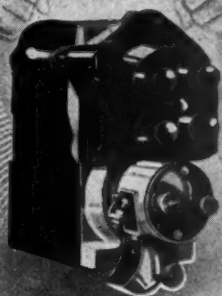
Manufactured for Canada by

DOMINION CHAIN COMPANY, Limited—Head Office: Shaughnessy Bldg., Montreal, Can.

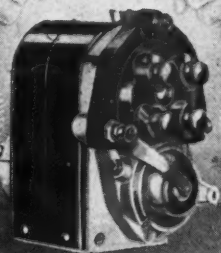


SPLITDORF

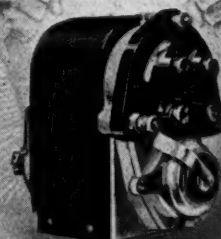
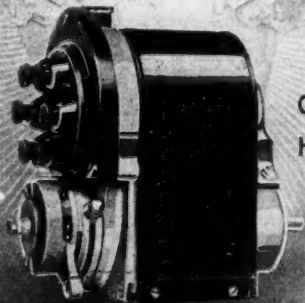
DIXIE
TYPE



MODEL EU4
HIGH TENSION
MAGNETO



CUNNINGHAM
HIGH TENSION
MAGNETO



MODEL EU4-2
HIGH TENSION
MAGNETO

SPLITDORF IGNITION devices for the 1915 season include several new types of magnetos of the high-tension variety. These have been designed to meet the clamor of automobile engineers for even more effective units for the popular demand.

Model EU4-2 is a big brother to the highly successful model EU4, being more powerful with its double magnets, and made for 4-cylinder motors developing as high as 40 horsepower. As standard equipment on 1915 Overland cars, among other makes of automobiles, the efficiency of the EU4-2 is "hall-marked" in view of the severe tests to which many thousands have been subjected.

Two new types of high tension magnetos, constructed particularly for easy starting without the use of battery, auxiliary coils or any external devices, are the DIXIE and the CUNNINGHAM.

The DIXIE TYPE is distinctly new and contains many interesting and valuable features—platinum points external to the main breaker-box—no wire on any of the revolving parts—field coil housed in the arch of the magneto—with timing lever at retard or advance the spark is of the same strength for any given speed—minimum loss of energy, etc.

In the construction of the CUNNINGHAM, there is practically no difference in the strength of the spark when the break is in advanced or retarded position, the speed remaining the same. By its construction an advance of 70° is obtained which is essential for long-stroke slow-speed 6-cylinder engines.

Operating slower than any engine will turn over on its own power and well below the limit for cranking speed, an equipment of either the DIXIE TYPE or the CUNNINGHAM overcomes every excuse for having batteries around the car for ignition purposes. All that is necessary with either, is a simple switch for shorting the magneto when stopping.

Study our exhibits:

New York Show: Space C-47
Chicago Show: Spaces 58-71

SPLITDORF ELECTRICAL COMPANY
NEWARK, N. J.

(All SPLITDORF features are fully covered by patent or patents pending)

— *now comes*



The **SHALER** Tube-Kit

The Newest Shaler Vulcanizer

The Shaler Tube-Kit is now ready. It costs but \$2.00 and is a guaranteed "Shaler"—the standard for vulcanizer quality. No motorists now need put up with temporary patches for repairing tubes. The Shaler Tube-Kit seals up perfectly any size rip or puncture and makes the repair as strong as the tube. Can take care of the largest size tubes without pinching edges.

**Does away with cement and patches—
makes tube repairs permanent**

The Shaler Tube-Kit makes temporary patches unnecessary. It takes no longer to vulcanize a tube with the Tube-Kit and make the repair permanent than it does to put on a temporary patch.

The Tube-Kit can be carried in the tool box for emergency road side work.

No exposed Blaze—No Smoke—No Soot.

The Tube-Kit can be used indoors because it is clean and free from smoke. The fuel is so contained that it cannot spill and flame up even if the vulcanizer is accidentally upset. There is a detachable handle for moving vulcanizer while hot. The Tube-Kit is nickel plated, clean and rust proof—Best Tube Vulcanizer made. Get one. \$2.00.

Free Tire Book for Motorists

"The Care and Repair of Tires." It is a guide and text book on the care and repair of tires. It describes fully how to protect the tires and explains everything you ought to know about them. This book is quoted as an authority by American and Foreign Automobile Publications, free to any motorist.

C. A. SHALER CO., 200 Fourth Street, Waupun, Wisconsin

World's largest makers of a complete line of Tire Vulcanizers for motorists and repair shops
Canadian Distributors—John Millen & Son, Limited—Toronto, Winnipeg, Montreal, Vancouver, Victoria

\$2.00

New Ford Model

for both Tubes and Casings

This model, designed especially to fit Ford tires, makes every practicable tube repair, and what is much more valuable, mends casing cuts too. Safe, simple, clean. No exposed blaze so can be used close under a fender.

The
**FORD-
KIT**

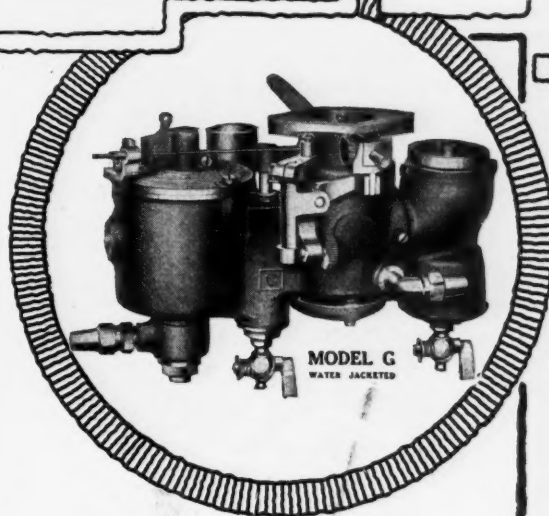
\$2.75

RAYFIELD

CARBURETORS

Getting the best in carburetors

WHEN an automobile maker adopts the Rayfield carburetor as standard equipment, he does so simply because he wants the best, and is willing to pay for it.



And generally, you will notice, Rayfield equipment is advertised by the cars that use it, because most people know that the Rayfield is the best carburetor on the market and naturally have confidence in the car manufacturer who uses it.

After all, compared to the selling advantage given a car equipped with a Rayfield and the much increased efficiency of the motor, what does the

slight extra cost of the Rayfield amount to? The owner of a car with Rayfield equipment will save in gasoline alone in the first two months' driving more than enough to make up its slightly greater initial cost to the manufacturer,

For every type of car, from the smallest to the largest, the Rayfield is absolutely guaranteed to save 10% to 50% in fuel and on all other points to exceed the performance of any other carburetor.

No matter what car you drive, you ought to have a Rayfield on it.

FINDEISEN & KROPF MANUFACTURING CO.

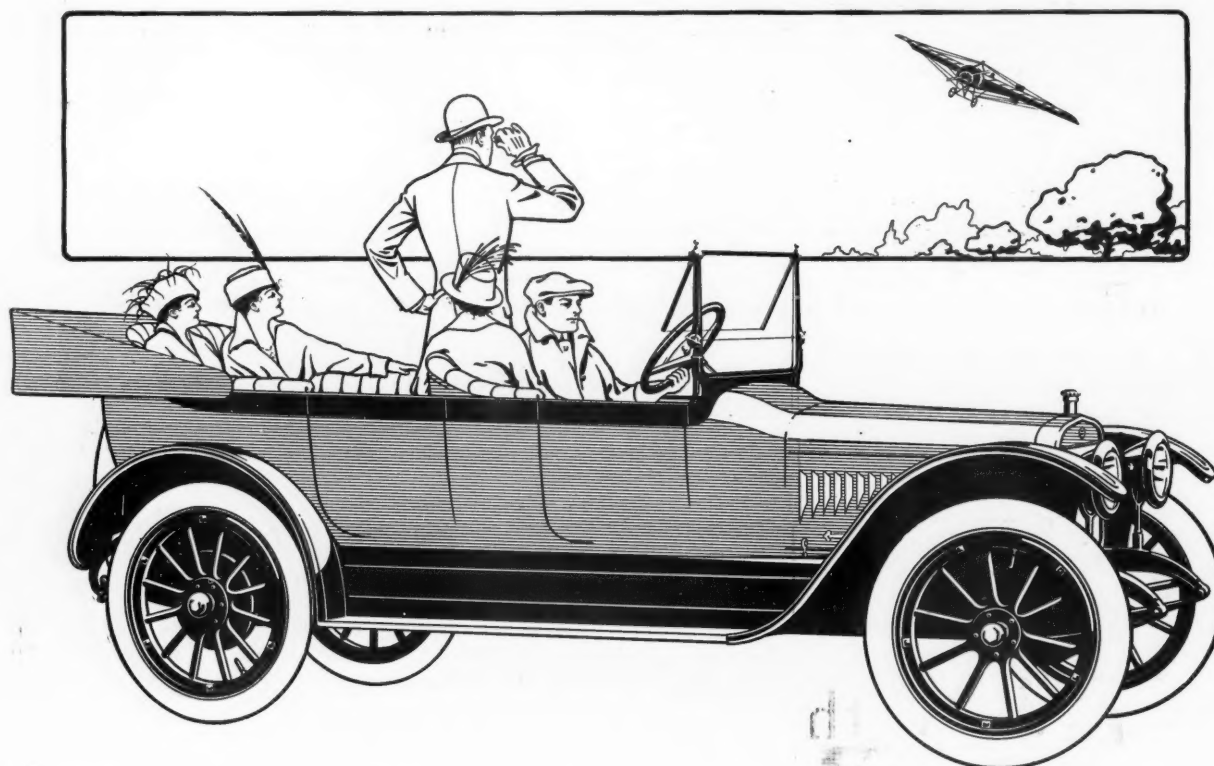
2109 Rockwell Street, Chicago, Illinois

Branches: 1140 Michigan Ave., Chicago

1211 Woodward Ave., Detroit

1902 Broadway, New York

A Totally New WINTON SIX



At A New Price—\$2285

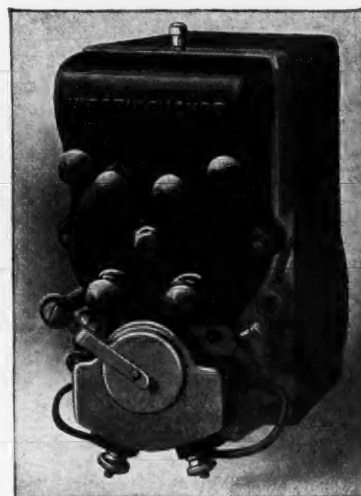
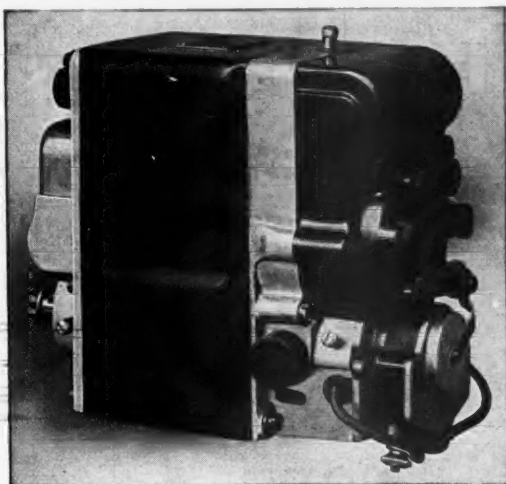
YOU can now buy a genuine Winton Six at \$2285. This new-size edition of a car famous for superiority—the car that made Sixes predominant—fills a place never before occupied, and supplies a want never before satisfied. Heretofore, buyers seeking a car of happy-medium size have been limited to cars of medium grade. Superior qualities were obtainable in only the largest and most costly cars.

Some makers, wrongly interpreting public desire for cars “not quite so big,” reverted to mechanically-inferior four-cylinder models; other makers produced small sixes to sell at prices so low that quality was obviously missing.

So frequently have buyers complained to us of their inability to obtain a well-powered, thoroly high-grade six of less-than-maximum size, that the Winton Company is now building a car to meet this particular requirement. We are ready to show you what we have produced, and to let you see for yourself how consistently we have expressed your idea of super-quality. You will find this new-size car to be a finished production, wholly free from experimental risks and doubts. Foremost of its mechanical features is the Winton Six motor, the motor that proved six-cylinder superiority to the world and converted the high-grade makers from fours to sixes. And thruout the car's construction will be found proof of engineering skill, experience, and fidelity to quality. Not in any sense a cheap car, this model is as distinguished in appearance and as superb in its provision for comfort and its appeal to taste as its \$3250 companion car, the Model 21 Winton Six. And in two further elements, the buyer secures an advantage not enjoyed by purchasers of any other make—Individuality and Service. By Individuality we mean that you may have your particular car finished in your own color scheme, thereby setting it apart from the great stream of look-alike cars one sees on the streets, and by Service we mean that at all times you will have the hearty cooperation of the Winton organization. Any Winton Six owner will tell you that Winton Service is without equal.

WRITE FOR CATALOG

The Winton Motor Car Co., 424 Berea Road, Cleveland, O.



Westinghouse Ignition and Lighting Generators

38 High Grade Cars now use
Westinghouse Electric Systems
26 of these cars are equipped
with
Westinghouse Electric Ignition

Here is the list; the stars indicate those with Westinghouse Ignition

*Allen	Chadwick	*Lenox	Pilot
*American La France	*Crawford	*Lexington-Howard	Pullman
Amplex	*Davis	Locomobile	Richard
*Atterbury	*Dorris	*McFarlan	*Seagrave
*Auburn	FIAT	*Marion	Singer
*Austin	Hupmobile	*Moreland	*Speedwell
*Briggs-Detroit	*Kissel	Norwalk	Standard
*Glide	*Kline	*Ohio	*Stewart
*Haliday	*Lauth-Juergens	*Pathfinder	*Vulcan
*Case		Pierce-Arrow	

Do not fail to see our exhibits

New York: January 2nd to 9th, Grand Central Palace, Spaces 89 to 92 and 97 to 100. Chicago: January 23rd to 30th, Coliseum, Spaces 85 to 88.

Westinghouse Electric & Manufacturing Co.

Sales Offices in all
large American Cities

Automobile Equipment Division

East Pittsburgh
Pennsylvania



DODGE BROTHERS MOTOR CAR

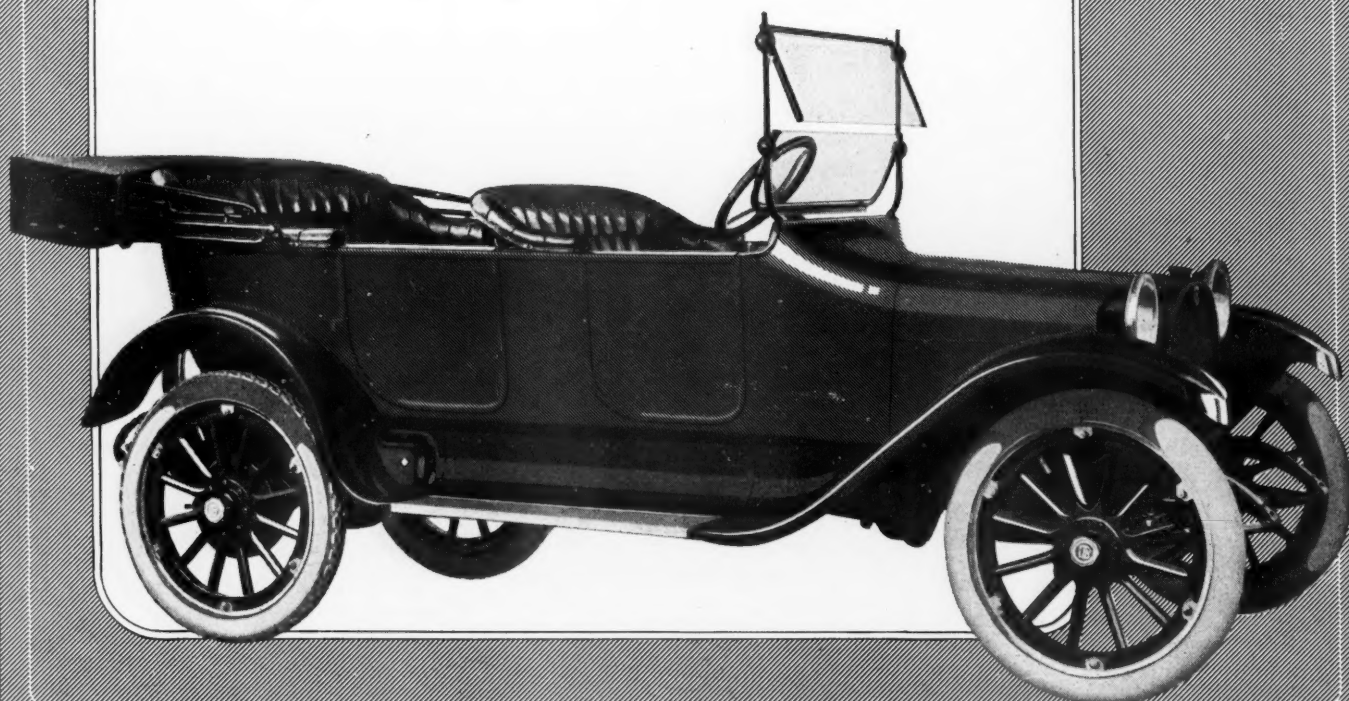
You are almost sure
to ask yourself how
it is possible to incor-
porate such quality at
so moderate a price

The equipment of the car speaks for itself: Timken bearings throughout; the S. R. O. ball bearings in clutch and transmission; the full-floating rear axle; the 30-35 horsepower four-cylinder motor; the real leather upholstery and natural curled hair filling; the chrome Vanadium steel springs; the Vanadium steel gears; the single-unit, chain-driven starter-generator; the Eisemann water-proof magneto; the fact that in direct drive no transmission gears are engaged or in motion; the almost exclusive use of drop forgings and drawn work; the perfect stream-line body; the specially designed oval fenders; the one-man type top—all these are recognizable as features beyond betterment

The price of the car complete is \$785
f. o. b. Detroit

Grand Central Palace—Space B1, Second Floor

DODGE BROTHERS, DETROIT



When Writing to Advertisers, Please Mention Motor Age.



SAVE YOUR FORD and ride in comfort-

Excessive Cost No Longer a Consideration



You have always admitted the need of a shock absorber on your Ford—but excessive cost has deterred the purchase.

No longer will you be obliged to deprive yourself of the luxury of easy riding that can so easily and inexpensively be yours now.

And the cost of operation, too—that you know can be materially cut down through the use of efficient shock absorbers on your Ford, and the C-C Shock Absorber performs both services in a highly satisfactory manner. No better nor more efficient shock absorber could be built at four times the price asked for this C-C.

We know, for we have been manufacturing metal specialties for over forty years, and have specialized on shock absorbers for the past five. You are familiar with the name Cox as associated with absorbers used on thousands of the world's heaviest cars. This experience in designing and manufacturing absorbers for cars from the 5000 lb. limousine to the 1000 lb. roadster has resulted in this C-C Shock Absorber—the most effi-

cient and the lowest priced absorber for your Ford.

Its construction is exceedingly simple mechanically—a slotted spring cage with two bolt holes through which the bolts are run, displacing the Ford shackle bolts, makes the attachments. Inside the spring cage a sturdy helical spring of finely tempered steel carries the weight of the car cushioning, softening and smoothing out every irregularity of the road. Inside the big spring—a smaller one—a compensating spring, twisted in the opposite direction governing, assisting the main spring. A nut at the top enables you to adjust at will the C-C Shock Absorbers to meet the peculiarities of your particular Ford.

The action of the C-C is such that when your Ford receives an extremely severe jolt, the rebound is checked by means of a spur so designed that automatically the entire capacity of both springs is brought into action, wholly absorbing that car and nerve-racking rebound, and giving to the occupants of the car practically a floating sensation. This is an exclusive feature with the Cox.

8.00
for set
of four

COX BRASS MFG. CO.
Albany, New York

BRANCHES:

1777 Broadway
N. Y. City

2637 Michigan Ave.
Chicago, Ill.

4.50
for set
of two



Go to the Automobile Shows determined to see the

Herff-Brooks
Four and Six

YOU dealers who are looking for cars that will sell freely because they are big values, will be well repaid by studying the show exhibits of Herff-Brooks cars.

Run down the specifications point by point, from the powerful motors to the well-built rear axles and the complete equipment.

Notice the number of crank-shaft bearings, the power, the high-grade Stromberg carburetor and best Bosch ignition. Observe the Timken and New Departure

bearings, the electric installation, the high-grade accessories, the complete equipment.

Frankly, such cars would be impossible at the prices if we did not build them complete in one huge factory where, for special reasons, overhead costs are very low. No car in the world is more completely manufactured in one plant than is the Herff-Brooks.

There will be much to see at the shows, but the one thing no dealer should miss is the Herff-Brooks exhibit.

Look at these specifications

Six
\$1375

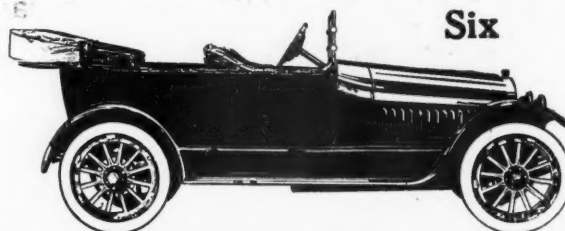
50 Horsepower
Six Cylinders, 4-in. x 4½ in.
Highest Grade Bosch High Tension Magneto DU System
Honeycomb Radiator
Stewart Speedometer
34-in. x 4-in. Goodyear No-Rim-Cut Tires
Stromberg Carburetor
Timken and New Departure Bearings
18-in. Folding Down Steering Wheel
124-in. Wheelbase
Seven Crankshaft Bearings
One Man Top
Turkish Upholstering
Electric Starting and Lighting
Demountable Rims, Extra Rim
Complete Equipment

Four
\$1100

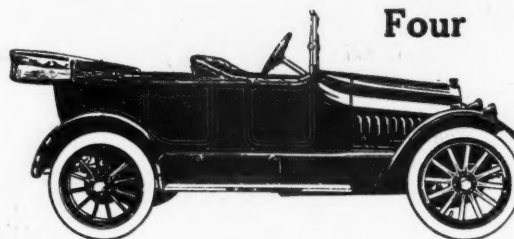
40 Horsepower
Four Cylinders, 4½-in. x 5-in.
Five Crankshaft Bearings
Drop Down Steering Wheel
One Man Top
118-inch Wheelbase
34-in. x 4-in. Goodyear No-Rim-Cut Tires
Electric Lighting and Starting
Stewart Speedometer
Honeycomb Radiator
Demountable Rims, Extra Rim
Timken and New Departure Bearings
Turkish Upholstery
Stromberg Carburetor
Bosch High Tension Magneto DU System
Complete Equipment

*Make our booth your headquarters.
Have your mail sent in our care
both at New York and Chicago.*

Space C-20 Third floor, New York
Space 15 Coliseum Basement, Chicago



Six



Four

Write for Catalogue MA

Herff-Brooks Corporation
Indianapolis, Indiana

THREE STRAIGHT

The ZENITH-EQUIPPED Hudsons
Win the Annual Harrisburg Economy
Contest for the Third Year in Succession

**1st Prize: Hudson 6-54,
21 Miles per gal.**

Carried 7 passengers and weighed 5750 lbs.

Averaged 30 miles per hour and fastest time.

Course very hilly with stiff head winds.

Leading Six and Eight cylinder cars competed.

**3rd Prize: Hudson Light Six,
22.6 Miles per gal.**

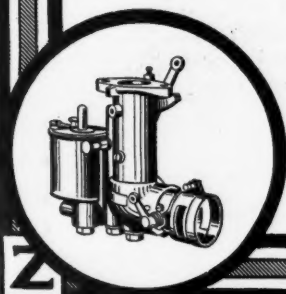
Carried 7 passengers and weighed 4425 lbs.

Ran over same course of 111 miles.

Beat every car of its class in contest.

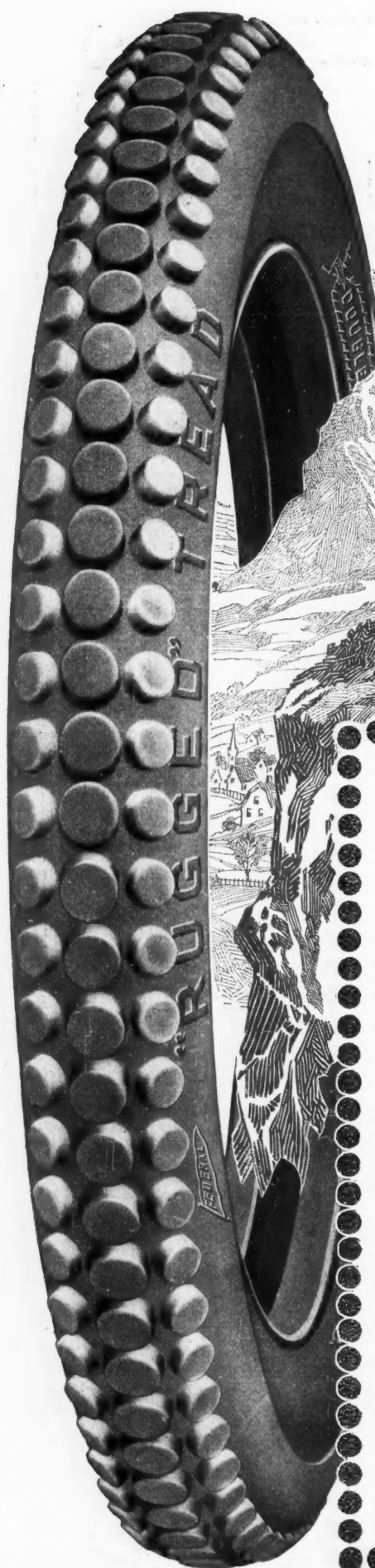
Perfect mechanical scores for both Hudsons.

*There were no Zenith representatives present—
no possibility of altering the non-adjustable
Zenith during the run. It was one more
“Bullseye” for the famous Compound Nozzle.*



ZENITH CARBURETOR CO.
DETROIT, U.S.A.





*As Sure-footed
as the Mountain Goat!*

FOR perfect security in motoring, for assured protection against the dangers of skidding, and for real Extra Service, thousands of motorists pin their faith to

FEDERAL "RUGGED" TREAD TIRES

The Federal "Rugged" is of much heavier, stronger construction than ordinary non-skid treads and no other is heavier. "Rugged" describes it accurately.

These big, sturdy studs of rubber, broad and thick, won't let your car skid. And from the path of the wheel they deflect many an object that would cut or puncture the tire.

Double-Cable-Base

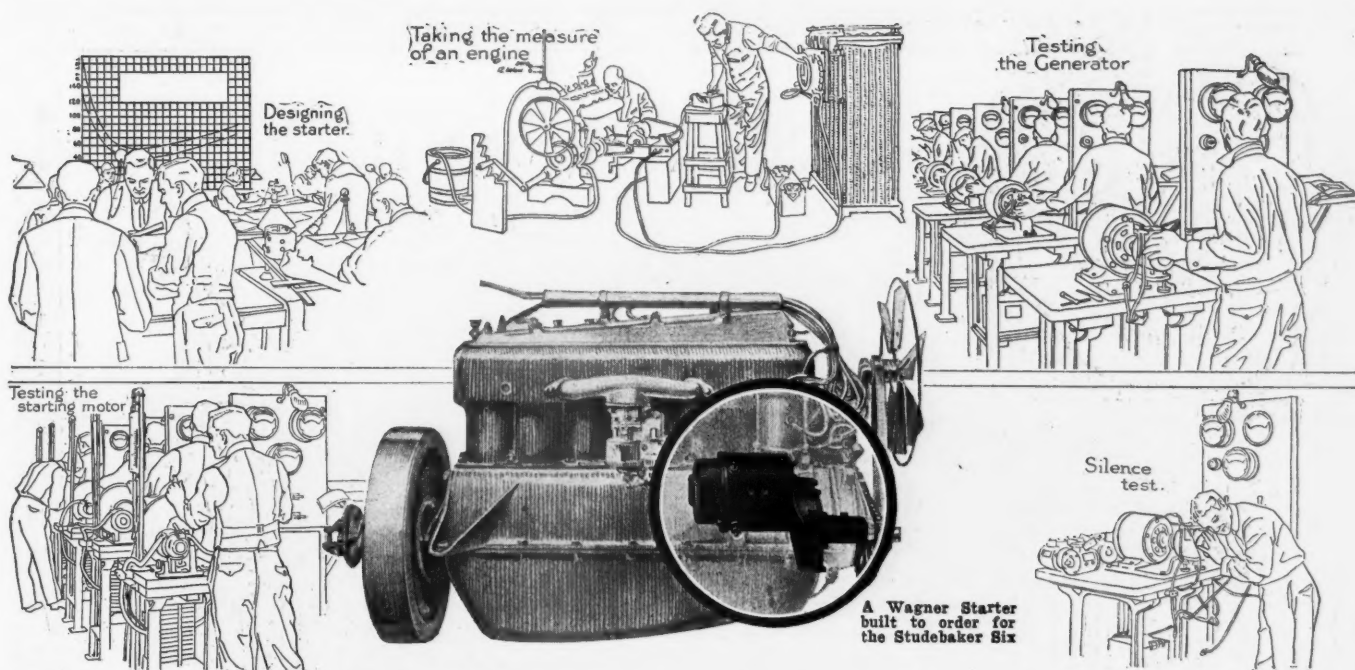
The exclusive Federal Double-Cable-Base construction positively eliminates rim-cutting, side-wall blowouts just above the rim, tube pinching, and the danger of a tire slipping off the rim.

Federal "Rugged" Tread Casings have been materially reduced in price but the Quality remains absolutely unchanged.

Improved methods of manufacture have lowered our production costs on these famous non-skid casings, and we have turned this saving to the benefit of the motoring public.

Begin using Federal Tires now and take advantage of their Extra Service.

FEDERAL RUBBER MFG. CO., Milwaukee
Branches, Distributors and Service Stations in all Principal Cities. Dealers Everywhere.



The start of *The* Starter that is built to order.

The Wagner Starter initiates with the car-builder's good judgment when he designs his car. It is never an after-thought. It is never built and added to a completed car. The fundamental idea back of the Wagner Starter is that it must be built to order for the car it is to start.

The car manufacturer and the Wagner engineers work together.

The man who buys this car has the same feeling of satisfaction with his starter that he has with his perfectly tailored suit—both are made to order, and both show to the best advantage.

The engine is designed with proper provision for the location of the starter. An engine is built and turned over to the Wagner engineers, who proceed to measure the engine's cranking requirements under all conditions. From this exact knowledge they design and build a starter that is perfectly suited to that particular type of engine.

The Wagner Starter

is built by expert engineers who have had 24 years' specialized training in the development of motors, generators, transformers, converters, rectifiers, and electrical instruments of precision. Their skill has made the term Wagner, Quality the sterling mark of the electrical industry, and it has made the Wagner Company third in size among the great electrical

machinery manufacturers of America. Everywhere, from the largest central lighting and power plants down to the smallest factories, you will find Wagner Motors and other Wagner, Quality apparatus doing efficient work. It must be evident that a Wagner Starter designed and made by such an organization must be right.

The story of the Wagner Starter and the great organization behind it is interestingly told in "The Starter That is Built to Order." Write for a free copy. If you are interested in motors, either single-phase or poly-phase, generators, transformers, converters, rectifiers or electrical instruments of precision, Wagner, Quality and Wagner Service will have a definite meaning to you. Confer with the nearest Wagner Branch or write



Wagner Electric Manufacturing Co., St. Louis, U.S.A.

**Factory Branches
and Fully Equipped
Service Stations**

Selling Agencies: Atlanta

Boston
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New Orleans

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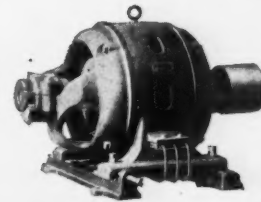
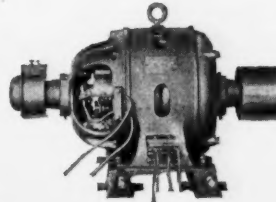
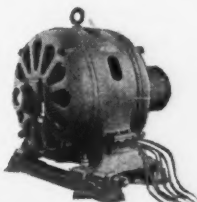
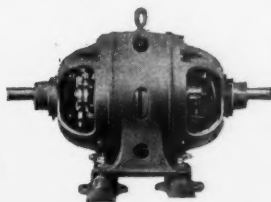
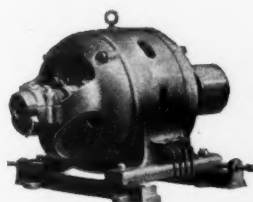
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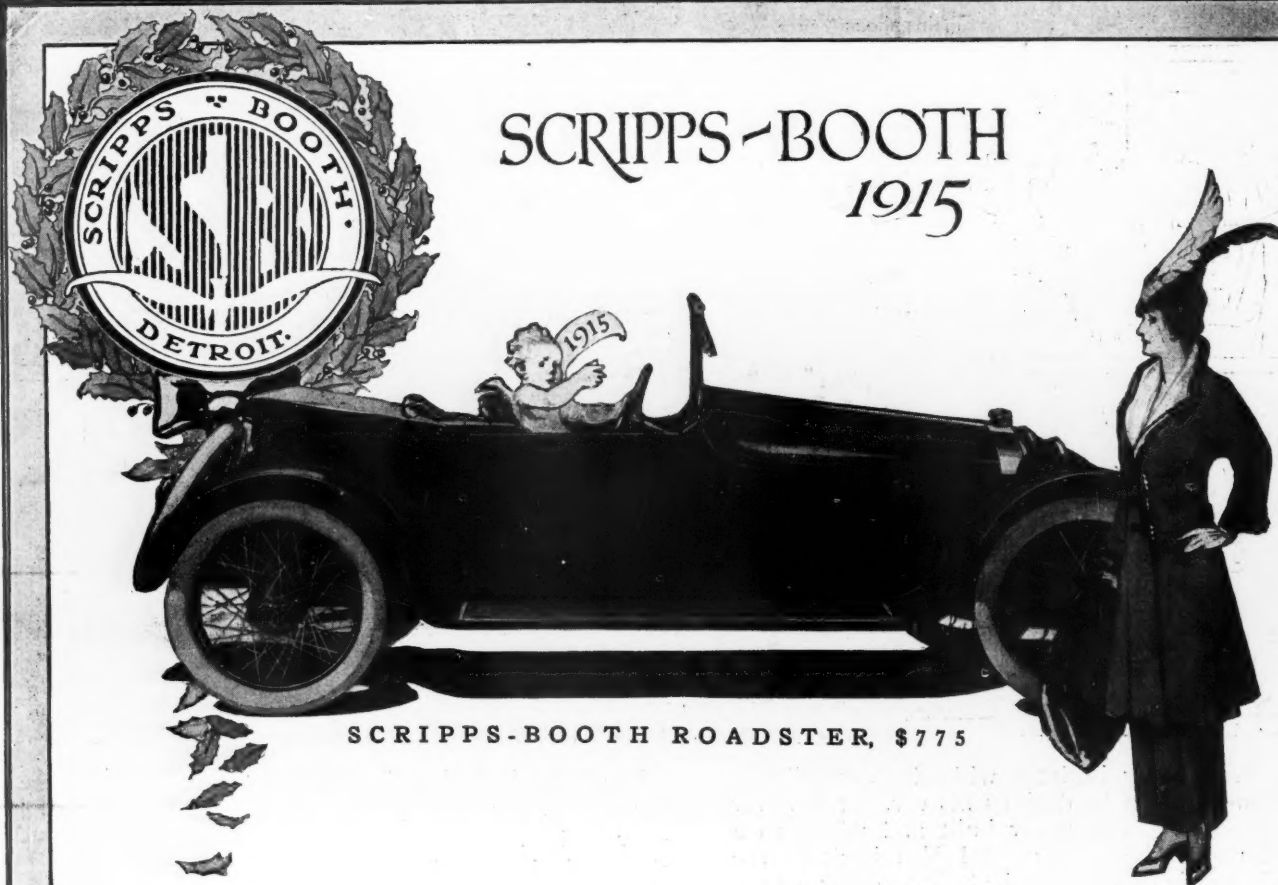
Syracuse
Cincinnati
St. Louis
Seattle

Salt Lake City



"Wagner Quality" the Sterling Mark of the Electrical Industry

When Writing to Advertisers, Please Mention Motor Age.

**SPECIFICATIONS:**

110-inch wheelbase, three passenger car.

MECHANISM

Four-cylinder motor, three-speed gear-set, shaft drive, bevel gear rear axle.

EQUIPMENT

Absolutely complete from electric self-starting and lighting system to electric door locks.

FINISH

Finest possible, both as regards upholstery, instruments, dash equipment and body finish.

DETAILS

Body — Streamline, torpedo stern, highest grade blue-black finish, domed fenders. Upholstery, finest quality long-grain buffed leather. Cowl dash instruments; sight feed oiler, lighting and dimming switches, starting strangler, starting and ignition switch, flush type speedometer, generator indicator, shroud light and foot space light.

WHEELS

Five Houk, triple-laced detachable wire, 30x3½ inches, wide hubs.

AXLE

Rear, full-floating, annular bearings throughout. Bevel drive. Ball bearing universal joints on the Kardan shaft. All gears and shafts 3½% nickel steel. Drive shaft tubular.

S H O W S

The annual motor car exhibits are intended as a display of the year's progress in automobile building.

This year marks the first entry of light weight as a chief design factor in cars of extreme luxury and quality.

SCRIPPS-BOOTH luxurious light cars are the epitome of motor car improvement for 1915, and express in line, mechanism and luxury of appointment, the final climax of motor car luxury up to the very date of opening of the national shows.

The display of SCRIPPS-BOOTH cars at New York and Chicago will set a better standard of luxurious motor car building than has heretofore been seen in any automobile exhibition in America.

SPECIFICATIONS:**MOTOR**

Sterling, valve-in-head type, high speed, gearset in unit, pump feed oiling with sight feed on dash, 2½ bore, 4-inch stroke, four-cylinder, water cooled. Develops 18 horsepower. Fitted with Zenith carburetor and Atwater-Kent automatic spark advance, connected with starter generator system.

STARTING

Bijur single unit electric, connected by silent chain, operated by locking dash switch.

SPRINGS

Front, semi-elliptic with over-slung frame. Rear, floating cantilever.

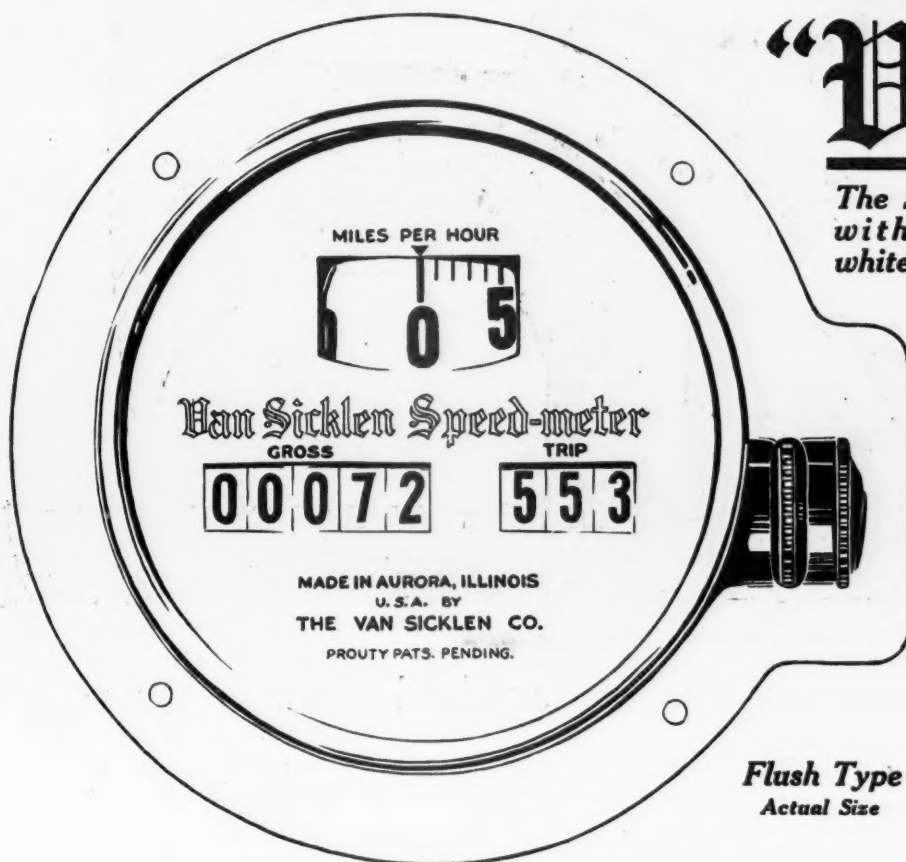
EQUIPMENT

Silk mohair top with side curtains, rain vision plate glass windshield, electric door lock, Klaxet horn, full tool equipment, jack. Luggage space at the rear large enough for two suitcases and tools. Spare Houk wheel, tire and tube on all cars.

FEATURES

Klaxet button in center of steering wheel cannot be operated when ignition switch is off, eliminating miscellaneous horn blowing while the car is standing. No projecting handles or slots in the doors. Electric door locks are operated by pressing a small push button.

SCRIPPS-BOOTH CO.,**DETROIT, MICHIGAN**



"Van"

The Speed-meter
with the big
white face - -

Flush Type
Actual Size

Van's face is white and clean as a recently washed schoolboy's. Only Van's face doesn't *shine*. One reason for his wide popularity is that he *reflects* on no one.

Van's face is lithographed on the back of the glass or crystal so that it reflects no light and cannot tarnish. Speed and odometer indicating dials are enameled a dead, non-glistening white. The numerals lithographed thereon set within 1-32 of an inch of Van's glass face. They can be easily read day or night by all the occupants of a car.

Van, like all regular fellows, is best known by his *works*. They're as simple and trouble-proof as a cotter pin.

Operation is based upon the generation and calibration of a steady-flowing current of air—making for infallible accuracy under every condition of service.

Van is made in three models—flush type for cowl-board installation, bracket type, and special Ford type.

Van is fully guaranteed in every particular. Prices and full information sent on postal request.

Van will be at the shows. Meet him at New York, Grand Central Palace, Space D 29, or at Chicago, Coliseum Gallery, Space 92.

THE VAN SICKLEN COMPANY

AURORA ILLINOIS

Central States Distributors: The Beckley-Ralston Company, Chicago
T. T. Roe, 847 Golden Gate Ave., San Francisco, California, Western Representative



A Guaranteed, Penetrating Hand Warning Signal

—that cuts for miles around, in the country, and tops the noises of the city streets. Constructed to force sound ahead, and hardly noticeable to occupants of the car.

300,000 motorists are using—

“GARFORD” Automobile Warning Signals

—because of their exclusive practical features.

The new GARFORD hand operated signal acts at the slightest touch. The plunger works without difficulty at all times, giving a clear, positive, sure warning. It also operates at an angle of 45°—an added convenience for the comfort and ease of the operator.

The horn is securely held from all directions by a 3-point suspension mounting. It is most attractively finished in black enamel with nickel plated bell flare. Only 4 points require lubrication.

Your safety is not assured until your car is equipped with this absolutely dependable and effective warning signal.

This is only one of the “GARFORD” models. Ask your dealer to see them all, or write direct to us.

Dealers—This \$4.25 GARFORD leads them all for results, price, and profits. Write for dealers' information today.

THE GARFORD MANUFACTURING CO., 2503 Olive St., Elyria, Ohio

BRANCH

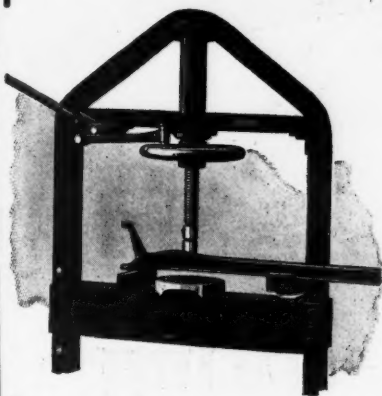
The Garford Mfg. Co.
Kansas City, Mo.

DISTRIBUTORS

The Dean Electric Co.,
Seattle, Wash.
The Dean Electric Co.,
Los Angeles, Cal.
Sumter Telephone Supply Co.,
Sumter, S. C.

Line up with

"The WEAVER Line" of Garage Equipment



WEAVER Garage Press

CAPACITY, 20 TONS

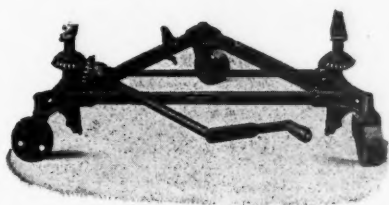


IN this 20-ton Press we are giving a greater range of service and capacity than can be had in any other press on the market and at about one-half the cost.

Think of the time, labor and worry you would save if you had this 20-ton Press at your command for straightening axles and shafts, pressing gears on or off, forcing hubs in or out of wheels, or the hundred of other jobs which you now try to do with a sledge. Besides the actual saving, it would enable you to do the work in a truly mechanical manner which your customers will appreciate.

CONSTRUCTION—One piece heavy channel frame; 15-inch hand wheel carried on ball bearings; 2-inch screw with Bronze Thrust Bearings. The hand lever has leverage of 1,500 to 1, though screw does not revolve. Maximum perpendicular capacity 48 inches; range of screw 12 inches; width between frame 32 inches; weight 425 lbs.

Net Price, \$48



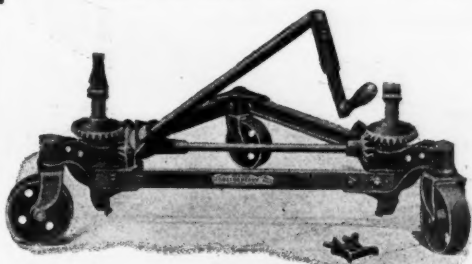
WEAVER Auto Twin-Jacks

NO Garage, Paint Shop, Repair Shop or Storage Room is complete without an equipment of these combination Turn Tables, Lifting Jacks, Transporting Trucks and Tire Rests. Each set will save one man's time and 50% of the floor space.

Made in Two Sizes

We are now making these Jacks in two sizes as follows:

REGULAR TYPE , capacity.....	4,000 lbs.
Per Set (Two).....	\$20.00
Singly (as shown above).....	12.00
EXTRA HEAVY , capacity.....	8,000 lbs.
Per Set (Two).....	\$38.00
Singly (As shown below).....	20.00



Extra heavy, capacity 8000 lbs.



WEAVER Auto Ambulance "FOR CRIPPLED CARS"

NO repair man need dread the task of "pulling-in" a disabled car if he is equipped with

this simple but scientifically designed Auto Ambulance.

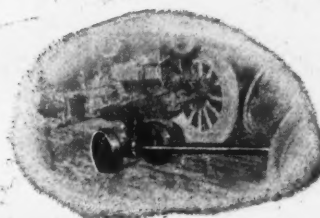
Quickly attached to either front or rear axle of the car; full range of adjustment to meet all conditions; high, broad, CAST STEEL wheels, will stand the service on city pavements or country roads. Telescoping tongue of double strength steel tubing; roller bearing 1 1/4 inch steel axle; weight, 140 lbs.

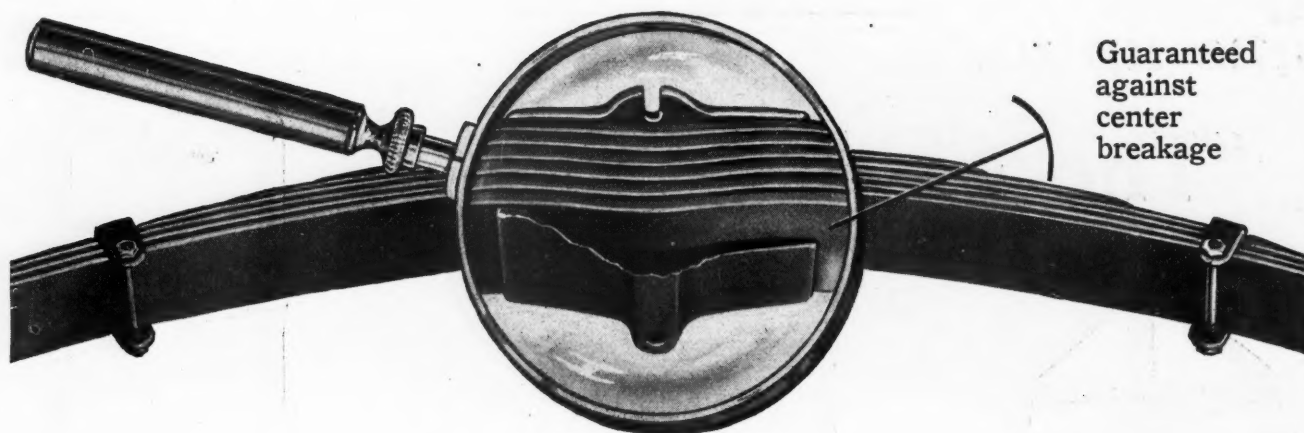
A Weaver Auto Ambulance, one man and a runabout can accomplish a task in half an hour which would ordinarily require three men a half a day to perform without this equipment.

Price, Complete, \$30

Manufactured by

Weaver Mfg. Co.
Springfield, Illinois





Replace it with a guaranteed breakless—squeakless spring

Better Quality

The Tuthill Spring is guaranteed absolutely and unreservedly against breakage at the center — where 75% of all springs snap. We do not qualify this guarantee by saying "breakage caused by defects in material or workmanship," but if any Tuthill ever breaks at the center, a very remote possibility, it will be replaced free.

And this guarantee is supplemented by the regular guarantee that goes with all Tuthill Springs, Titanic or otherwise.



Guaranteed Against Center Breakage

Easier Riding

The knowledge that the springs in your car won't break when you are miles from a repair shop is worth far more than a whole pocketful of neatly engraved guarantees. What you want is a spring that won't break—that's why you should specify that the

springs on your new car be Tuthill Titanics or when you have the old springs on your car replaced.

We keep a Tuthill Titanic in stock for practically every make and model of car, and can express it on a moment's notice.

This service enables the repair man to build up a big replacement business, as the Tuthill Titanic is unequalled in quality by any other spring, it costs less, and the profit is larger. And the Tuthill Titanic makes a satisfied customer and keeps him so. Write for price list.

You Never Rode on an Easier Riding Spring

Tuthill Spring Co., 772 Polk St., Chicago



Strongest at the center where the greatest strain comes

When Writing to Advertisers, Please Mention Motor Age.

Free on request. The most scientific book on lubrication

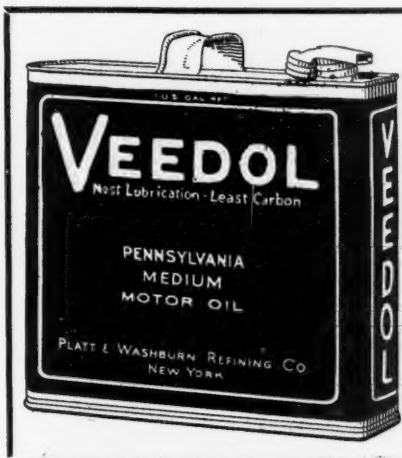
In our motor testing laboratory, the only one of its kind, every type of gasoline motor was tried out with every kind of oil. This was done to discover the best oil for every motor under summer and winter conditions. This book tells results of value to every motorist.

What this book means to you

If you get exactly the right grade and quality of oil for your engine its life is vastly increased. This means money saved. All parts of your motor will suffer less strain and wear. Only then can you get the full mileage. Saving on gasoline will pay your whole oil bill. Also—you will escape the engine troubles that do most to spoil the joy of motoring.

What this book contains

This book contains 44 pages and 48 colored illustrations showing all types of lubricating systems and the testing apparatus. It explains how engines operate and how oil lubricates them. It tells you how you can prove the qualities of oils. This book covers the subject fully in every respect. It is the result of years of study by the best oil experts.



Partial List of Contents

What Oil Means to Mankind.
Lubricating Don't's.

The Ten Lubricating Systems:

1. Full Splash.
 2. Splash with Circulating Pump.
 3. Pump Over and Splash.
 4. Force Feed and Splash.
 5. Pump Over.
 6. Separate Force Feed.
 7. Force Feed.
 8. Full Force Feed.
 9. Knight Slide Valve Motor.
 10. Oil Fed with Fuel.
- Marine Motors.
Motor Cycle Lubrication.

The Upkeep of Your Motor.
The Two Cycle Engine—Operation.
The Four Cycle Engine—Operation.
The Subject of Carbon.
Disc Clutch Lubrication.
Transmission Lubrication.
Differential Lubrication.
Chassis Lubrication Diagrams.
What Happens to the Oil in Your Motor.
Liquid Fuels—Tests.
Motor Efficiency at High Altitudes.
Automobile Lubrication Chart.
Motor Cycle Lubrication Chart.
Marine Motor Lubrication Chart.

Do not fail to see our exhibits at the New York and Chicago Shows

We shall display charts, diagrams and working parts showing how to prolong the life of your motor and cut expense.

New York, Grand Central Palace, Fourth Floor, D-23.

Chicago, Coliseum Annex, Number 181-182.

PLATT & WASHBURN REFINING CO.

Established 1876

Incorporated 1885

General Office: Eleven Broadway, New York

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Please send me free of cost a copy of your VEEDOL Booklet.

NAME
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I buy my oils from(Garage).

I am interested in () Automobiles () Motor Cycles () Motor Boats.

When Writing to Advertisers, Please Mention Motor Age.

Court of Appeals Decides in Favor of the BOYCE MOTOMETER Against Stewart-Warner

States in their decision the "Boyce" Patent on Radiator Indicators is Valid. Upholds Judge Hand's decision in lower court

United States Circuit Court of Appeals,
Second Circuit.

Before

JUDGES COXE, WARD and ROGERS.

Part of the opinion written by Judge Rogers is as follows:

"The record discloses absolutely nothing antecedent to the Boyce invention even remotely suggesting the inventive thought embodied therein. No prior use which has ever been made of a thermometer was brought to the attention of the court which contained any suggestion of the novel mode of operation used in the Boyce device, nor did it appear that any thermometer was ever used to secure any result at all analogous to that secured by the invention of the patent in-suit.

"The evidence shows that prior to 1912 there was absolutely nothing known in the automobile art which would enable one running an automobile to discover an undue heating of the engine in time to rectify it and avoid irremediable damage. It was not until complainant's motometer was invented that any instrument existed which could be used in connection with automobiles to give warning of a dangerous condition of the engine. In the face of the affidavits which were presented, the utility of the complainant's device cannot be doubted." (The court here quoted expert affidavits upon the merits of the Boyce motometer.)

"It also appears that upward of 10,000 Boyce devices have already been sold in the short time they have been on the market, and that, although sold on a condition that the device might be returned within thirty days if found unsatisfactory and the money refunded, not one single instrument was ever returned."

A radiator heat indicator as its history shows is the most useful automobile device now in service. We predict that just as soon as its merits are known every water-cooled car will be protected with this instrument.

21,000 Boyce Motometers are in use today, only 2000 were in use one year ago today.

We take this means of warning the trade against selling and infringing Radiator Heat Indicators. This company is the exclusive licensee of Boyce patents, Nos. 1,090,776, 45,099, 43,987, 92,818, 45,042, 44,627 for Radiator Heat Indicators. Other patents are now pending in the Patent Office.

The Boyce Motometer is now on sale at your supply store. There are two models, selling at \$5.00 and \$10.00. The instrument can be applied to any car in five minutes' time.

MOTOMETER COMPANY, Inc.

Main Office—1790 Broadway, NEW YORK CITY

See us at the Shows—New York, Booth D-77;
Chicago, Booth 104, Coliseum Annex



How Will You Motor

The NACO Way

Or The Other Way?

Real Resiliency
Safety
Economy
Relaxation
Perfect Comfort

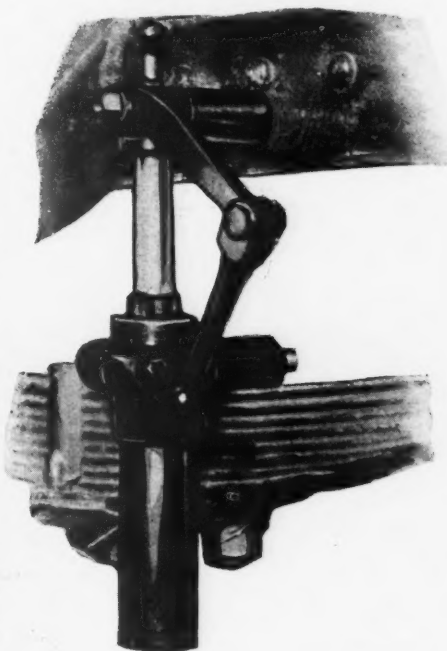
Will you sit back in an easy-riding car and enjoy the comfort and relaxation of real resiliency, or do you prefer jolts, bumps, discomfort, and repair bills?

Jolts
Bumps
Repair Bills
Depreciation
Discomfort

The NACO Way is the easiest way—it is the path of least resistance. Every bump and shock is smoothed from your road by the **NEUTRALIZING EXPANSION PISTON** of the NACO mechanism.

The NACO "Master Control" handles the road, levels the uneven stretches and neutralizes the grind. It insures perfect comfort for the occupants of your car, who often are unable to withstand the bumps you partly overlook.

And by prolonging the life of your springs, the NACO absorbers help keep your machine always in commission—ready for instant use and comfortable riding.



The "other way" is the way to backaches and the repair-shop. The constitutions of many lay motorists refuse to stand the abuse of bad roads—and a day's tour often leads to indisposition that lasts a week or more. Your mother, wife, daughter, and sister must have an easy riding car for the sake of their health, as well as their comfort.

And besides, the machine won't stand the strain long. Bumps and jars to unprotected springs result in repair bills and general depreciation, that soon amounts to more money than a set of NACO Shock Absorbers, that keep things in order.

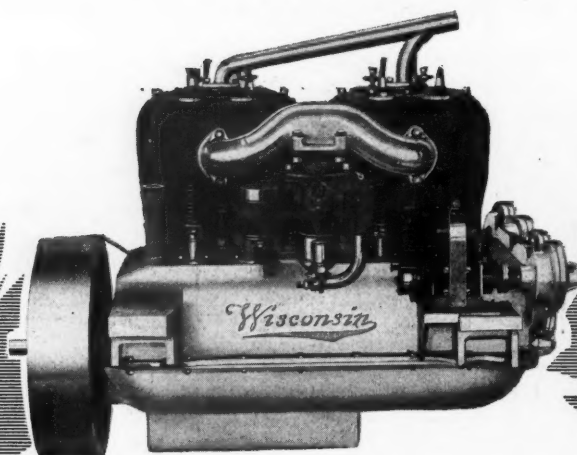
NACO Shock Absorbers are made in 3 sizes, for cars of 2400 to 4000 pounds, set of 4, \$36; for cars under 2400 pounds, set of 4, \$30. Rears only, at half price. Ford set of 3, \$18.

NACO Cushion Spring Shackle Links act as auxiliary springs. FORD set, \$8. Larger sets, \$10 to \$25.

Dealers — NACO is a money-making proposition.
Write for details and agency, today.

National Appliance Co.
Grinnell, Iowa





WORLD'S CHAMPION ROAD RACING MOTOR

IN the last four years the WISCONSIN has won more official road races than any motor made—more than any other motor in road race competition has won **within the last ten years**. The WISCONSIN Motor has placed 27 times out of 35 entries.

It was a WISCONSIN-equipped Stutz which this year won the famous Los Angeles-Phoenix Road Race—696 miles of fight, over the worst of roads, up steep mountain slopes, through desert sand and gullies swimming with mud. This race is conceded by authorities to be the stiffest, most gruelling **actual service test** to which a power plant has ever been put in the history of motoring. This race proved the stamina and unflinching consistency of the WISCONSIN Motor as nothing else could.

Bear in mind that road racing is the **supreme test** of a motor—a test many times more trying than the most brutal carelessness and abuse to which a motor might be subjected in every-day service.

An investigation of the exclusive features of this motor will prove well worth your while. Write for full descriptive literature.

Wisconsin
CONSISTENT

Wisconsin Motor Mfg. Co. Station "A" Milwaukee, Wis.



The Improvement in Radiators

THIS RADIATOR OF LESS CAPACITY AND GREATER EFFICIENCY MEANS LIGHTER WEIGHT AND SURER COOLING.



THIS HANDSOME, SIMPLIFIED AND NON-CORRODIBLE RADIATOR MEANS PERMANENT SATISFACTION TO THE CAR OWNER.

The National Can Company takes pleasure in announcing the fact that they are now in possession of the most valuable patents and the most successful construction in the radiator field. For years they have manufactured radiators of other types for some of the most famous radiator concerns, but today they are in position to market to car manufacturers radiators which, because of their continuous bands of brass, will give a durability in service unequalled by any other radiator.

The National Can Company has the reputation for making only the best of products and the NATIONAL RADIATOR will surely be no exception to that rule.

Note our advertisements appearing in this paper from week to week, and you will understand why when a car is equipped with the NATIONAL RADIATOR it is equipped with the very best that the car manufacturer could purchase. Such selection is a recommendation for any car.

**THE NATIONAL CAN COMPANY,
Detroit, Mich.**

You will save enough on tires in a year, because of proper inflation, to more than offset the cost of the

MANZEL ENGINE DRIVEN TIRE PUMP **MANZEL**

A pump at \$20 that does the work of tire inflation with the absolute minimum of effort on your part, that pumps to the efficient limit dictated by the size of your tires, and then automatically shuts off the air supply, preventing over-inflation, with resulting blowouts, and damage to your tubes and casings.

It is easy to install—"a screwdriver, a file and a wrench"—these are the tools you need, and you don't have to pay a mechanic to put it on for you. Once on it's on to stay. It weighs less and occupies less space than any other pump of the same capacity.

When you want to use it, simply couple on your hose connection, throw your pump gears into mesh, start your engine, and sit back for two or three minutes—your tire is inflated to the efficient pressure determined by its size, and then our unique safety valve takes off the

MANZEL BROTHERS

**Factory and General Sales Offices,
Leaders, for 16 years, in the manufacture of quality oil**

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pressure and prevents over-inflation. Even the air is purified—dust, grit, oil and particles of foreign matter are filtered out at the intake.

The whole operation is predetermined with scientific accuracy in the design of the Manzel Pump. Its two cylinders insure absolutely even pumping—a uniform air supply, without jar, jerk or backlash that marks the single-cylinder pumping with its resulting damage to gears and disturbance of magneto timing.

The Manzel pump is a perfect piece of mechanism in itself—accurately fitted, precisely machined; aluminum crankcase, phosphor bronze connecting rods and bearings; fine gray iron cylinders, pistons and piston rings—in fact, everything in its composition and machining has the stamp of highest quality.

The design is at the same time most efficient and most economical, and the combination makes a pump that is a big money-saver to you at \$20—and it's the same pump, plus further refinements in detail, that thousands of motorists gladly paid \$28 and \$30 for last year.

Your dealer undoubtedly stocks Manzel Two-Cylinder Engine Driven Pumps. If not, order from us direct.

We carry in stock Fittings for the following cars:

Abbott-Detroit, Buick, Cadillac, Cartercar, Case, Chandler Six, Chalmers, Cole, E.M.F., Franklin, Hudson, Imperial Six, Kissel Kar, Maxwell, Michigan, Mitchell, Oakland, Oldsmobile, Overland, Packard, Paige-Detroit, Rambler Cross Country, Reo, Simplex, Speedwell, Studebaker, Stutz, Velie, and others.

Here's the Pump

Weight, 7 Pounds

Half
Actual
Size

Retail Price

\$20

Complete with all fittings, including 15 feet of air hose, pressure gauge, etc.



S COMPANY

308 Babcock St., Buffalo, N. Y.

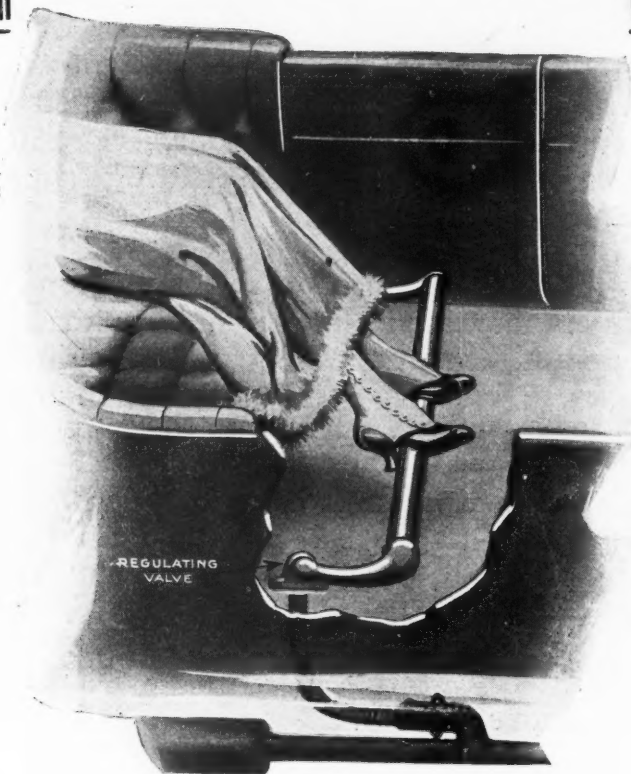
pumps for heavy duty steam and gas engines.

Portland, Me.
Providence
Portland, Ore.
Philadelphia

Pittsburgh
Richmond
St. Paul
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Salt Lake City
San Francisco
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The Best Selling Winter Accessory on the Market



See these
car comforts
at the
Auto Shows

K.P. Foot Rest Heater

It does seem foolish that a gasoline engine should be generating so much heat and let it all go to waste, while the passengers in the tonneau shiver with the cold.

Everybody appreciates the foolishness of that situation and realizes at a glance how simple and practical the K.P. FOOT REST HEATER is in the way it makes use of an otherwise waste commodity.

The K.P. is noiseless, odorless and expenseless. It is a handsome ornament in a car, for it looks infinitely better than the ordinary foot rest. Its regulating valve makes it easy to control by the passenger. It is easily attached. Furnished in lengths to fit any car, and made up in oxidized, nickel-plated or brass finish.

The price is \$25 (f. o. b. New York), including all parts for attachment.

The dealer who has put it on display has found that it is as near a self-selling device as he could handle.

Now is the time to sell them.

Now is the time buyers want them.

Now is the time you should handle them.

Get complete literature and dealers' proposition.

K.P. The K.P. Foot Rest Heater Company
250 W. 54th Street New York City

and at every "J.M." Shock Absorber
Distributor ——— listed herewith.

When Writing to Advertisers, Please Mention Motor Age

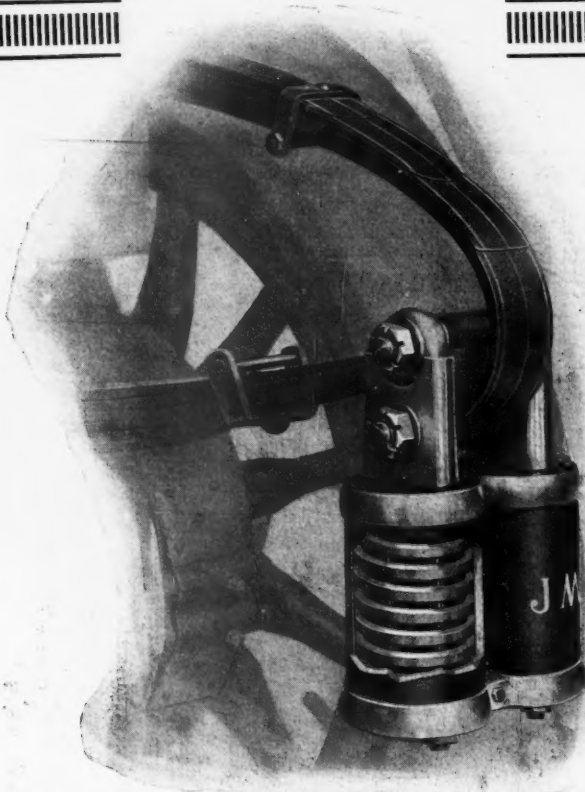
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No Dealer's Establishment is Realizing Maximum Profits without the

New York Show
Booth D 42

Chicago Show
Booth 99



J. M. Shock Absorber

They are the only really perfect shock absorbers built. They were the first of their kind, and have always maintained the highest conceivable standard of materials and construction.

The J. M. SHOCK ABSORBER business is the kind of business any highly reliable dealer is proud to have. "J M" stands for the best in shock absorbers and when a man buys this kind at a legitimate price which gives a reasonable profit to the dealer, the J. M. Shock Absorber Company stands behind them with its nation-wide service and its responsible guarantee.

The J. M. is now produced for cars of every size and type. Altho the J. M. famous Twin type, shown at the top, has proved itself supreme for large cars, yet we have produced other models which exactly meet the needs of lighter weight cars.

The Ford J. M. Type 3 (shown below) has established its reputation as the greatest of all Ford Shock Absorbers. It is not the cheapest but it is the least expensive in the long run. It assures real comfort to all Ford owners and it lives as long as the car. Has a unique sliding tube container and is self-oiling. Illustrated pamphlet "P" tells all about it.

NOW NEARLY READY. A NEW TYPE J. M. FOR OVERLAND AND SIMILAR CARS

This absorber meets the demand for cars of not over 3500 pounds. It is based on J. M. principles, has J. M. construction and efficiency throughout. For Overland, Buick, Hupmobile or any car (except the Ford lighter than 3500 pounds) this is the shock absorber.

Write today for full details on this J. M. Type Z-2.

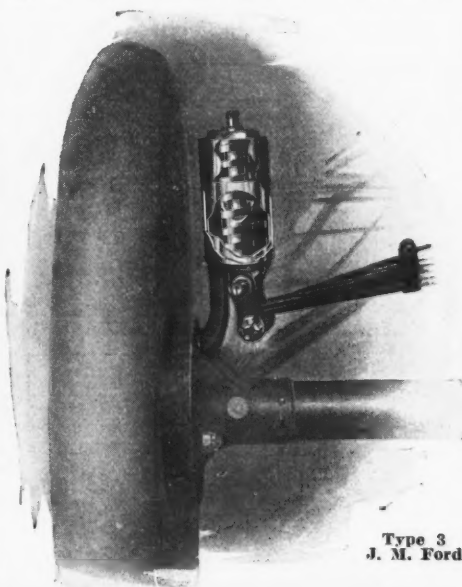
The Big News in Shock Absorbers
The "J.M." Shock Absorber Co., Inc.

Main Office and American Factory:

210 So. 17th Street, Philadelphia

New York Factory Branch
250 West 54th Street

JM



Type 3
J. M. Ford

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ALSO IN EVERY CIVILIZED COUNTRY.

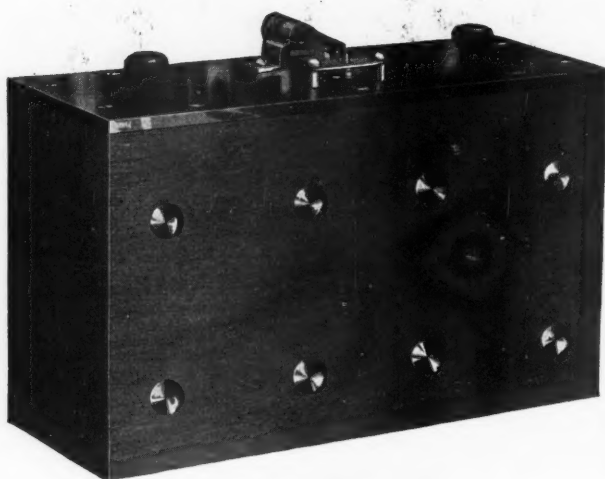
ANNOUNCEMENT

KINGSTON

Single Vibrator Coil for Ford 1914-15 Cars

Only One
Vibrator
Adjustment

A Perfect,
Even Spark
at Every
Plug



Why Use
Four
Vibrators
When One
Will Work
Far Better?

IT fits in the metal coil box used on 1914 and 1915 Ford cars. Just take out the four vibrating units, slip in the KINGSTON SINGLE VIBRATOR COIL and notice the difference.

It will solve all Ford ignition troubles. The spiral spring on the vibrator will not allow the contact points to stick.

Thirty days' free trial. Write for particulars.

AGENTS—There will be a large demand for this coil. Write for our proposition by return mail.

Kokomo Electric Company, Kokomo, Ind.

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650 Woodward Ave.

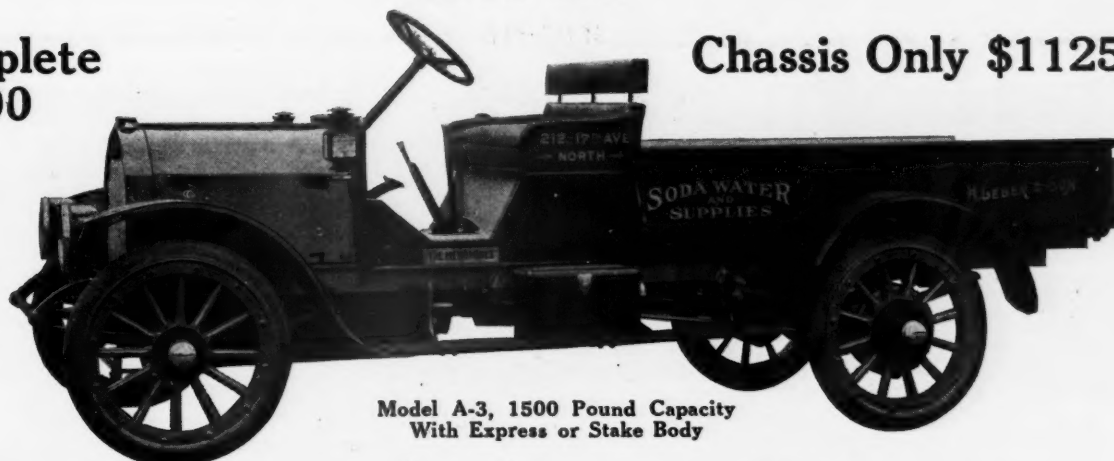
*Space 64
Chicago Show*

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Largest Manufacturers of Spark Coils in the World

**Complete
\$1200**

Chassis Only \$1125



Model A-3, 1500 Pound Capacity
With Express or Stake Body

"The MENOMINEE" TRUCKS

FOR ECONOMY

With a 1500-pound capacity chassis at \$1125, complete with Express or Stake Body at \$1200; one 2000-pound chassis at \$1400, complete with Express or Stake Body at \$1500, and a third one of 3000-pound capacity at \$1800 for chassis and \$1950, complete with Express or Stake Body, "The Menominee" offers a line of high quality trucks covering a wide range of service at attractive prices.

Why It's Easy To Sell MENOMINEES

It's always easy to sell a man what he wants, and what he needs—if the price is right and the investment good.

The MENOMINEE is there—in three models—at the exact size his business requires, and at a price that is in proportion to his resources.

That's why MENOMINEES are easy sellers.



Why Customers Reorder MENOMINEES

—MENOMINEE customers are satisfied. Their trucks give them quick, uninterrupted service.

Once the MENOMINEE has proved its unusual value and durability, the customer refuses to "try out" a strange truck, at big expense.

Satisfied customers stick—and MENOMINEE customers are satisfied.

DEALERS ALL OVER

—the United States are making good money handling MENOMINEES exclusively, because MENOMINEES fit the big man, who operates many 1½-ton trucks. They fit the man who finds 1-ton sufficient capacity.

—And they faithfully serve the tremendous numbers of business men who can find profits in a 1500-pound truck, at \$1200.

Let Us Help you make your sales. Our plan is different. Mail attached coupon today, and learn how MENOMINEE manufacturers co-operate with their dealers.

D. F. Poyer Company
Menominee, Michigan

(COUPON)
D. F. POYER CO., Menominee, Mich.
Gentlemen: I am interested in "The MENOMINEE" Motor Truck.
Kindly send me complete information.
Name
Address
If a dealer check here ☐





No. 200. Combination "Presto" Cigar Lighter and Lamp. Complete with holder. Price \$3.50.



No. 281. "Presto" Inspection Lamp. Full reflector, 3-in. diameter, nickel-plated, highly polished, 10 ft. cord, regular battery terminals, 6-volt, 2 c. p. bulb. Price \$1.



No. 286. Same, 3-in. lens, \$1.25.



No. 204. "Presto Ford" Cigar Lighter. Designed especially for the Ford car. Complete with holder. Price \$2.50.



No. 205. "Presto Star" Cigar Lighter. For other cars, \$2.50.



No. 230. Combination Dash and Trouble Lamp. Complete with 10 ft. of cotton cord, and 6-volt, 2 c. p. Tungsten Edl-Swan base bulb. Price \$2.00.



No. 235. Special for Ford cars, \$2.00.

Every motorist needs "Presto" Specialties. The best equipped cars carry our Cigar Lighters, Inspection Lamps, Hand Lamps, Dash Lamps, and Combination Dash and Inspection Lamps.

The complete line is built as perfectly as we know how and guaranteed for service.

"Presto" Cigar Lighters have pure platinum lighter tips. They last; others don't.

DEALERS: Add these Presto Accessories to your catalogue and stock them. You will find them winners from a profit standpoint. They sell easily, don't conflict with your other lines and carry a generous margin of profit for you. Write today for terms.

Metal Specialties Mfg. Company
 736-38 W. Monroe Street, Chicago, Illinois

Western Branch.....604 Mission St., San Francisco
 Eastern Branch.....1779 Broadway, New York City



No. 252. Automatic Cord Winder, with cigar lighter (No. 202) and holder. Price \$5.00.



No. 291. A combination trouble lamp and Search-light, with 6-volt, 6 c. p. Edl-Swan base bulb. Price \$2.25.



No. 292. Same with single or double contact Anchor plug, \$2.50.



No. 1000. "Presto" Electric Hand Lamp, an adjustable light for attachment to any dry battery. Price, \$1.00. With battery, \$1.25.



No. 640. Metal Dash Lamp. A close, compact lamp for counter-sunk clocks, speedometers, vibrators, etc. Price, \$1.00.



No. 645. Same for wood dash, 90c.



No. 203. "Presto" De Luxe Cigar Lighter. Complete with 6-ft. silk cord, ebony finish handle, pearl push button, interchangeable tip and bulb and nickel plated holder. Price \$4.50.

11,000

Car Owners
in Chicago
Last Year Purchased



Encased

FIFTEEN

Taxicab Companies
of Chicago
Last Year Installed

The JOHNSON SHOCK ABSORBER

"The only spring shock absorber with a positive recoil check"
—as full car equipment.

To Secure Comfort and Service

Machines equipped with JOHNSON SHOCK ABSORBERS, not only insure luxurious ease, but materially lengthen the life of the engine and other wearing parts, by eliminating jolts. Ask your dealer for JOHNSON SHOCK ABSORBERS—or write direct to us.

Dealers—Your profits on JOHNSON SHOCK ABSORBER business could be large. Write today for our paying dealers' sales plan.

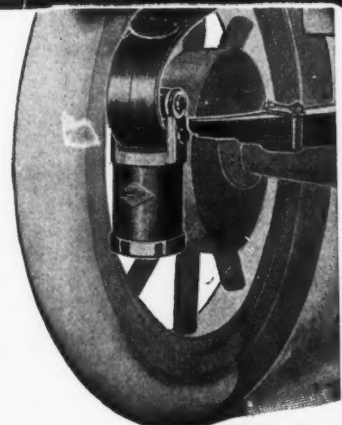
TRIPLE ACTION SPRING COMPANY

(Established 1906)

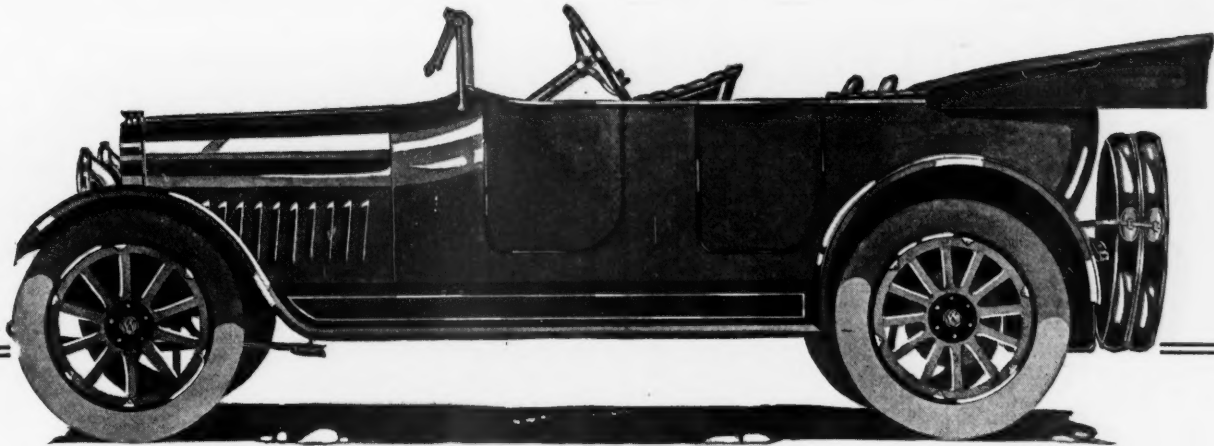
61-63-65 EAST 28th STREET, CHICAGO



Exposed



¾ Elliptic Type



Model U, Light-Weight Six Cylinder, 7-Passenger 50 H. P. Touring Car, \$1585. F. O. B. Richmond, Ind.



Distinctive Westcott Features

Ample aisle way between front seats.
Dry cells added as auxiliary ignition.
Elimination of sod pan.
Firestone demountable rims.
Non-rattling doors, new style bumper.
Crowned fenders.
One-man top, true to name.
Gas tank in rear, with gasoline gauge.
Stewart vacuum gasoline system.
Highest grade folding, double ventilating windshield.
Horn button in center of steering wheel.
Klaxon make electric horn.
New spark control, both hand throttle and hand spark control.
Top fastened to windshield by new style ball and socket brackets.
"Jiffy" quick adjustable curtains carried in top.
Standard Delco lighting and starting system.
More leg room in front.
Black enameled cellular molded radiator.
Highest quality improved leather.
Cantilever rear springs 52 inches long.
Larger valves, tungsten steel.
Northway motor.
Nine Perfection piston rings on each piston.
New designed cam shaft with higher lift.
Automatic spark advance.
Triple heat treated springs.
Advanced type of stream line body.
Headlight dimmer switch.
Non-skid rear tires.
Aluminum covered running board and floor boards.
Solid walnut instrument board with unique and advanced instrument arrangement and two large compartments, provided with lock, for tools, gloves, etc.
Increased tool space.
Flush tonneau light.
Rim wind and rim set clock.
Improved fender supports, resulting in the elimination of vibration.
Combined instrument board lamp and inspection lamp (new feature).
Westcott design disappearing auxiliary seats.
All wires in metal armor.
Improved cushion springs.
New and exclusive method of upholstering, more comfortable and durable.

1915 Westcott 1915

35 H. P. 4 Cylinder, 5-Passenger Touring Car—
3-Passenger Roadster—2-Passenger Speedster

\$1185

F. O. B. Richmond, Ind.

50 H. P. Six Cylinder, 7-Passenger Touring
Car—3-Passenger Roadster

\$1585

F. O. B. Richmond, Ind.

A NEW VALUE

Read the wonderful features of the Westcott here, before you visit the show. In justice to yourself, know the Westcott as you know other cars. Prepare yourself for a revelation of automobile value unrivaled in the history of the industry.

See this noteworthy product of the Westcott Motor Car Company—See and examine this car that is BUILT ON HONOR, is mechanically perfect, and which has been so carefully worked out in every detail, from the user's standpoint.

The Test

Clip the Westcott features from this announcement. Read them to prospective purchasers without divulging the name of the car—and ask them how much such an automobile should be worth.

We rely on the answer to substantiate our claim that the Westcott is the greatest automobile value in the world.

Dealers

Write for the particulars of our remarkable proposition. Learn how your connection with this financially strong and old established house will benefit you. WRITE TODAY.

WESTCOTT MOTOR CAR CO., RICHMOND INDIANA

Use Your Exhaust to Heat Your Car

Install a BAILEY Auto Heater and keep warm this winter. The BAILEY Heater consists of a valve placed in the exhaust line between engine and muffler, or at the end of muffler pipe. From this valve the heated gas passes through flexible tubing to the heater proper, which comprises an improved muffler, seamless tube, located in a metal box. The radiator lies flush with the floor and has an ornamental gridded, nickel-plated surface.

BAILEY AUTO HEATER

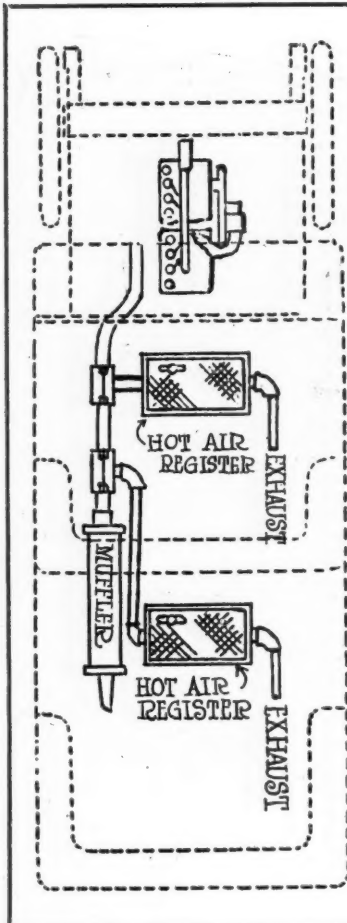
Readily installed by anyone. Weight less than 15 lbs. Absolutely odorless and noiseless. Full directions for installation accompany each heater. In ordering give outside measurement of exhaust pipe and make and model of car.

Price, complete,

\$20.00

Live Dealers Answer

Bailey Auto Heater Co.
228-232 West Croton Avenue
New Castle, Pa.



The Dowst Magazine Binder



will quickly and securely bind each magazine as received. It binds one magazine or a complete file without mutilating, such as punching a hole in the magazine, gluing, lacing, etc. No strings, clamps, springs or locks used.

Retains at all times the appearance of a neat and substantially bound book, no matter whether there is one magazine in the binder or a complete file. Nothing complicated, nothing to get out of order.

Through a special arrangement with the manufacturers, MOTOR AGE will be pleased to furnish Dowst Binders to its subscribers at \$1.50 each.

Each binder holds 13 copies of "The Car Owners' Weekly."

MOTOR AGE
1006 Karpen Building, Chicago, Ill.

(22)

Is There Anything You Don't Know About Automobiles?

"THE AUTOMOBILE CATECHISM" (de luxe edition) is a complete course in automobile instruction—every subject discussed and illustrated so that YOU will grasp every point worth while—every bit of mystery is made as simple as A B C. You are interested—you are instructed—you are directly benefited. Its information is final.

It's a handsome piece of book work—splendidly printed, with 101 illustrations; flexible black leather binding, rounded corners and gold-edged pages—beautiful, while being intensely practical.

It will be to your immediate financial advantage to acquire an intimate and practical knowledge of cars and their parts. Lack of knowledge is expensive.

We want every reader of Motor Age to have a de luxe copy of "The Automobile Catechism." To make our offer irresistible we have decided, FOR A LIMITED TIME ONLY, to CUT THE PRICE IN TWO. This half price (\$1.25) will prove the best investment you ever made. Remember, this is the de luxe edition—264 pages—every page full of real, money-interest value.

Send your order, today, before the supply is exhausted, to—

THE CLASS JOURNAL COMPANY
900 S. MICHIGAN AVENUE
CHICAGO, ILL.
(17)

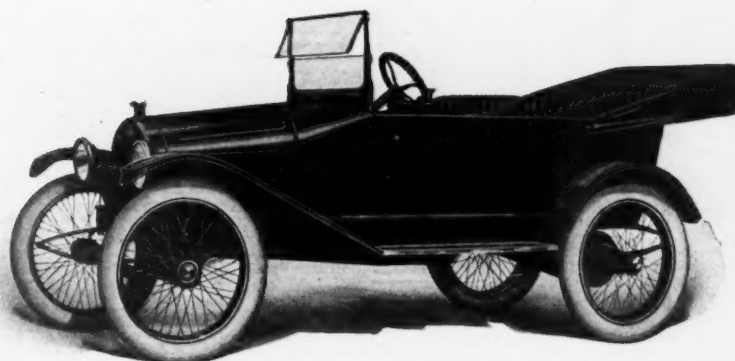


Regular Price, \$2.50
Special Price, \$1.25

\$600

Equipped Complete
including
Gray & Davis Electric Starter
and Electric Lights

Plate glass rain-vision built-in wind shield.
Stream line body, instant "one man" top.
32-inch wire wheels.
32 x 3 1/2-inch Goodrich clincher tires.
Tufted upholstery, deep cushions.
105-inch wheel base, standard tread.
Left-hand drive, center control, fibre grip gearless transmission, 25 h. p. water-cooled motor, Bosch magneto, Hyatt roller bearings, speedometer, built-in gasoline gauge, robe and foot rails, signal horn, jack, tools, etc.



This new METZ Touring Model is a winning proposition for enterprising dealers. It is a strictly high class car, deserving of your fullest confidence and recommendation, its attractive price being by no means its chief "talking point."

METZ '25

The Quality Car

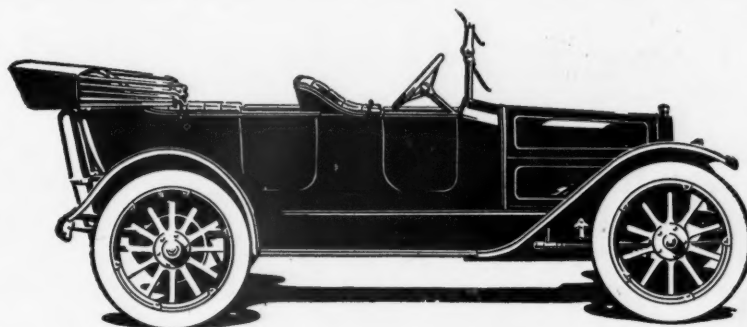
It is impressively complete and up-to-date, from its wire wheels and electric starter to its one-man top and electric lights. Wonderfully easy riding, clean-cut in design, luxuriously finished, and so simple in operation and reliable in performance that a woman can safely drive it.

We have planned and are developing an elaborate publicity campaign designed specially to help our dealers. We want representation in your territory. Write for particulars and new catalog "K."

METZ COMPANY

WALTHAM, MASS.

The purest stream line body on the American market. Beautiful one man top, clear vision, rain vision, ventilating windshield.



Remy electric starter. Electric lights. Combination starting system, requiring no switch key. Latest system in use.

Cartermobile, \$985 Fully Equipped, 115 Inch Wheelbase

The Cartermobile opens up a new field in its price class. This long looked for mechanical masterpiece is known by practically every mechanic in the United States. We have had our hands on the pulse of the public for fifteen years, and know what the average family wants.

The Cartermobile is a car of comfort, affording plenty of room, is neatly built, easy to drive, easy to operate, deeply upholstered, and beautifully constructed. We realize that we have to stand behind our guarantee, and consequently have built the Cartermobile to stay good. No matter what high priced car you have in mind, this big family car will please you in every detail.

We could have produced a car at one-half the price. However, we do not care about marketing a product which would necessitate our having a net-work of service stations extending over the entire United States.

We want to assure the motoring public that we are giving them an honest, proved product. For years the Cartermobile has proved itself without a superior in point of reliability. The Cartermobile has a brilliant future. Where you see a Cartermobile you see a car of unsurpassed distinction. Don't buy a car till you have investigated this remarkable value.

This car has a 115 inch wheelbase, 33-4 tires, crown fenders, one man style mohair top, demountable rims, pure streamline body, electric lights, electric starter, dimmer, etc., etc. Write for catalogue.

Dealers: Write for agency proposition today. We are closing territory fast.

CARTER MOTOR & MFG. CO., 119-121-123 CENTER STREET, HANNIBAL, MO.

\$425**HALL LIGHT CAR****\$425****Specifications**

MOTOR—4 cylinder, cast en bloc, unit power plant, 2 1/4 bore, 4 in. stroke, water cooled, thermosyphon system, valves enclosed, 18 H. P.

IGNITION—High Tension Magneto, dust and water proof.

WHEELS—28-inch non-rust, heavy wire spokes; 28x3 clincher tires.

TRANSMISSION—Selective sliding gear, two speeds forward and reverse.

CLUTCH—Multiple Disc dry plate, Raybestos faced.

AXLES—Special forged steel I-beam front, semi-floating rear.

DRIVE—Shaft, full ball bearing, enclosed in torsion tube.

FRAME—Pressed steel channel-underlunge with Hall Patented Safety Underlunge Frame.

STEERING—Pinion and Sector, left hand, standard. Full length running boards.

CONTROL—Spark and throttle lever on steering column, clutch and brake pedal, center control gear shift.

SPRINGS—Semi-elliptic, front and rear.

LAMPS—Electric, front and rear (Prest-O-Lite optional).

WHEEL-BASE—100 inches, tread 36 inches.

CLEARANCE—Standard automobile clearance 10".

EQUIPMENT—Top, windshield, horn, lights and tools.

WITH LIGHT WEIGHT, INSURING LOW UP-KEEP COST—STRONG, SIMPLE, FOOL-PROOF CONSTRUCTION, ELIMINATING MECHANICAL TROUBLE — EXCEPTIONAL RIDING QUALITIES OF THE UNDERSLUNG CAR, WITHOUT DANGER OF ACCIDENT THROUGH SPRING BREAKAGE, WHICH IS ELIMINATED BY THE HALL PATENTED SAFETY UNDERSLUNG FRAME—ABUNDANT POWER AND EASE OF OPERATION—BODY LINES AND FINISH OF EXCEPTIONAL DESIGN AND BEAUTY—THE HALL MOTOR CAR COMPANY OFFERS TO THE PUBLIC A LIGHT CAR OF TRULY DISTINCTIVE TYPE AT A REMARKABLY LOW PRICE.



Hall Light Cars are built in four different models to meet all requirements. The roadster for general use—the speedster for sportsmen and young fellows with a leaning towards speed—the coupe as an ideal all-weather car for ladies—the commercial delivery for general commercial use the year round.

We are fast closing contracts, but still have some valuable unoccupied territory. Address Sales Manager.

\$425**Hall Motor Car Co.**

Offices and Factory, Waco, Texas

\$425**HIGH and LOW TENSION MAGNETOS****MASTER VIBRATORS ROAD SMOOTHERS AUTO LOCKS**

Don't Use Imitation Springs and Contact Points In Your

**MASTER VIBRATOR**

K-W Master Vibrator owners are warned against the use of imitation springs and contact points on their Master Vibrators, as these positively will not work. For your protection all K-W points are put up in sealed envelopes, sealed with a label bearing our registered trade-mark. Look for this K-W seal label and the K-W Trade-Mark that is stamped on the top of the "T" shaped bridge.

When replacing contacts use complete new springs. Do not solder new contacts to old springs, as solder destroys the contact and the spring itself will become bent and the cushion effect destroyed. The contact points on K-W Master Vibrators are large and are made of genuine platinum iridium, a material that costs three times as much as pure gold. Make sure you get the genuine with the K-W trade-mark. Price \$3 per pair.

In buying your Master Vibrator be sure you get a K-W. Look for the K-W trade-mark and the serial guarantee number. They protect you against imitations. If your dealer can't supply you we will send one direct, postpaid, on receipt of price. Write for "That Satisfied Feeling Folder."

HEADLIGHTING OUTFITS

THE K-W IGNITION CO.
2835 CLEVELAND, OHIO, U.S.A.

SPARK COILS SPARK PLUGS

The Motorists' Purchasing Association

LTD.

London, England

is open to take up the exclusive British Agency for a first-class make of pleasure car to sell here in competition against the "Ford" models, of which very large numbers are sold in England. We also deal largely in all kinds of motor accessories.

We have a considerable demand for light and heavy trade motor vehicles, including ambulance and heavy trucks for War transport purposes.

Only enterprising firms who are in a position and wishful to do an important and permanent business with England need trouble to correspond, as our Association, having the largest Membership and following of any purchasing organization of motorists in Great Britain, can command extensive sales for a really good reliable car at a popular price. We have the finest Showrooms in London—in the best position, and an experienced staff to display and sell the goods.

Highest references to London and New York Bankers and satisfactory guarantees for fulfilment of all obligations by both sides, will be given and required.

Correspondence is invited from suitable firms.

Address—Managing Director,

MOTORISTS' PURCHASING ASSOCIATION LTD.,
Egyptian House, Piccadilly,
London, England.

A Tip for 1915!

Long flexible springs, so popular on up-to-date cars, add to the riding ease on small bumps but allow more side-sway and more up-throw on the big bumps when not loaded to the limit.

GABRIEL SNUBBERS

are the one device that prevents excessive spring action, and keeps you riding in comfort on the seat instead of being bounced from it.

STANDARD FACTORY EQUIPMENT

on the easiest riding cars including, Chalmers, White, Peerless, Stearns-Knight and Lozier—partial or special equipment on over twenty other leaders.

Specify "Snubbers" on Your New Car

Gabriel Horn Mfg. Co., ¹⁴¹⁵ E. 40th St. Cleveland, O.

Ask the Engineers of your car about Snubbers—they have tested them and know.



Big Price Reductions On Horns

The **AERMORE**
Exhaust Horn

Effective January 1st

Because we are making the AERMORE HORN in much larger quantities than during 1914, our manufacturing costs are lower. We give the automobile user the benefit in lower prices.

No. 1.	15 in. size, for cars 40-60 H. P.	\$7.50, formerly \$10.00
No. 2.	12 in. size, for cars 30-40 H. P.	6.50, formerly 9.00
No. 3.	11 in. size, for FORDS and light cars	5.50, formerly 8.00
No. 4.	Motorcycle Horn	5.00, formerly 5.50

NOTE THESE FEATURES

The AERMORE HORN has absolutely no up keep expenses. There are no wires, ratchets or batteries to wear and get out of order.

It is a musical horn. The signal is a loud warning, but does not frighten. Four separate and distinct notes are blown at once, producing perfect harmony.

The price is so low that every car owner can afford one.

Made of brass tubes, and malleable iron. Will not break, and lasts as long as any car.

Self-cleaning—will not clog.

It is operated by a foot pedal and is easy to install.

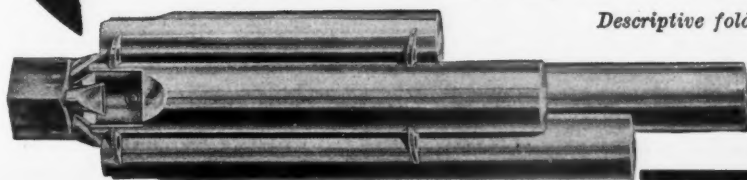


"EKLIPS"
Spark Plugs
None better.
Send for Prices.

DEALERS' DISCOUNTS

These are liberal. Write for 1915 Discount Sheet.
Sold direct to consumers only where local dealers do not handle them.

Descriptive folder gladly sent on request



The Fulton Company

727-729 National Ave.,
Milwaukee, Wis.



Do You Suppose Your Passenger Enjoys This?

—Do you suppose he is having a “good time”? Of course he offered to pump the tire because he felt he had to. And of course you let him while you were putting the tools away. Eighty pounds’ pressure by hand is too much for one normal back. But a

MAYO SPARK PLUG PUMP

—would have simplified matters. Your passenger wouldn’t have had to “work out” his ride. The MAYO Spark Plug Pump would have turned the trick in 2 to 4 minutes—pumping pure, clean air into your tire.

The MAYO Pump is adapted to all cars. Instantly substituted for any spark plug. Complete with 12 ft. hose, gauge, all connections—

\$10

MAYO Quick Detachable Spark Plug, \$1.50 extra, may be used if desired. Investigate the two latest additions to our line—the MAYO Ford Pump complete with gauge, 12 ft. hose, all connections, \$8.00, and the MAYO Valve Cap Pump for permanent attachment to the motor, complete at \$15.00.

**TRY ONE FREE ON YOUR CAR
FOR 30 DAYS**

DEALERS—Next time your customer will use a MAYO instead of a friend. Write for liberal dealers’ proposition.

MAYO MFG. COMPANY

55 E. 18th St.

Chicago, Ill.

See us at the Shows—

New York,
Grand
Central
Palace
Space
D-213
or at
Chicago,
Coliseum
Annex,
Space 184



The Motorist’s Winter Friend

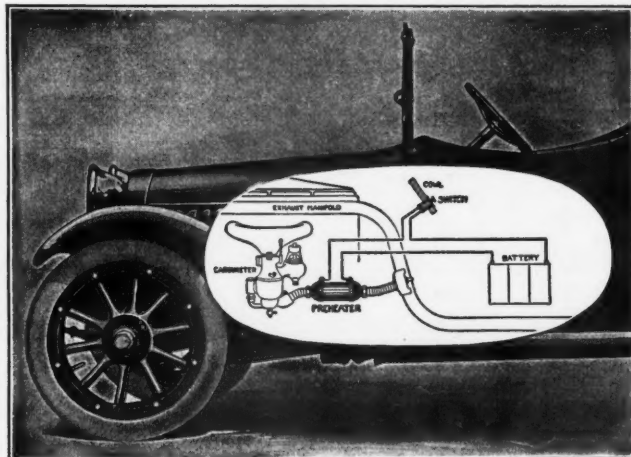
You Can Start Your Motor Easily When It’s Cold If Your Car Is Equipped With a



CARBURETOR — AIR — PREHEATER

PATENTS PENDING

“INSURES QUICK STARTING IN ZERO WEATHER”



METHOD OF INSTALLATION AND WIRING DIAGRAM. ANYONE CAN INSTALL IT —ANYONE CAN OPERATE IT

The Paul carburetor air PREHEATER is an electric heater, quickly attached to the fixed air intake of the carburetor. It heats the air before passing into the carburetor and is operated by the starting battery of the automobile or from any six volt source. It is turned on for starting only.

Every motorist knows that starting in cold weather is extremely difficult because gasoline does not vaporize readily at low temperatures. With a Paul PREHEATER vaporization is absolutely insured.

You Can Let Your Car Stand Indefinitely

Prolongs battery life with electric starters.

Eliminates excessive pressure with air starters.

Eliminates long and tiresome cranking with hand cranked motors.

Price, complete with Cowl Switch, 15 feet of wire and full instructions for installing and operating.....\$8.00

Delivered any part U. S. A.
Write for FREE descriptive booklet No. 4071
When ordering advise us diameter of air intake line
Agents wanted in every city

MANUFACTURED BY

Fort Wayne Engineering & Mfg. Co.
FORT WAYNE, IND.

HOLDS THE LARGEST ! BLOW OUT

The K-C Safety Lock Patch completely encircles innertube—"Safety Lock" feature prevents spreading—can't bulge through blowout. Sure repair for rim-cuts. Made of highest quality Tire Fabric.

"Safety Lock" formed by edges dovetailing and locked with wire keys. Leaves no gap. Protects tube at every point.



You might cut away a section of the casing from bead to bead, and this patch, safely locked in, will hold the pressure.

Safety Lock Patch

All
K-C Tire
Accessories
will be
displayed
at
New York
Show

Sold by Leading Auto Supply Dealers and Garages Everywhere. Or, Write Us for Complete CATALOG—of—K-C Tire Accessories.

WESTERN TIRE & RUBBER CO.

"America's Largest Tire Accessory Makers"
KANSAS CITY, MO.

THE ECLIPSE Anti-Rattler Adjustment Bolt for FORD CARS

Ask any
practical
repairman.

Look it
over
yourself!



Good Clean Business in Carrying This Grand Little Ford Device

A fast-selling article which fills a real need. Invented by an expert service-department man. Keeps the steering wheel tight; that's safety. Stops the rattle; that's a good thing, too.

You sell this service (for a dollar) to lots of Ford owners, and that's a profitable transaction every time. Our proposition will show you that this is one of the live ones.

Send for "Yours"—
Quick

**\$1 Per
Pair**



MADE IN U.S.A.

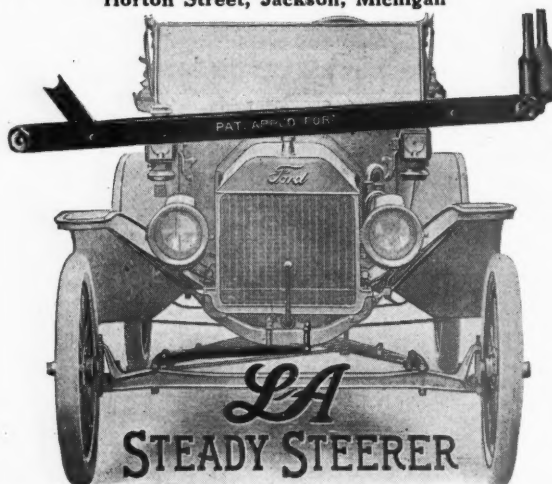
ECLIPSE MACHINE CO.
ELMIRA, N.Y.

LA Steady Steerer FOR FORD CARS

MAKE YOUR FORD WALK the CHALKLINE

Would you give \$2.00 to make your Ford "hold the road" at high speed? To keep your Ford from acting as though it wanted to take to the sidewalk when you turn a corner? To make your Ford steer easy over rough roads? The L-A Steady Steerer completely overcomes these conditions. It is a small, inconspicuous strut or radius rod, connected between the body and axle in such a way as to eliminate all body side-sway—the cause of the trouble. If the L-A Steady Steerer is not obtainable at your dealers, send \$2.00 and receive one direct from the factory. Dealers—write for prices at once. Every Ford owner is a sure buyer.

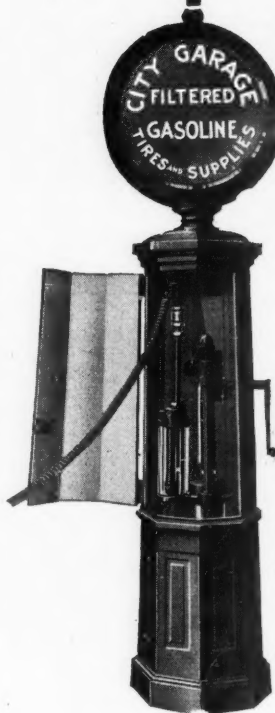
LOCKWOOD-ASH MOTOR COMPANY
Horton Street, Jackson, Michigan



An Illuminated Curbside Pump

It attracts trade. A handsome advertisement for your place of business. The pump is rapid in operation, strong and reliable. Measures with absolute accuracy.

TOKHEIM
QUALITY
OIL AND GASOLINE
OUTFITS
For Public And Private Garages



Tokheim Outfits are supplied in all sizes, at all prices, for all requirements—for both public and private garage use. Used by the United States Government and O. K'd by underwriters.

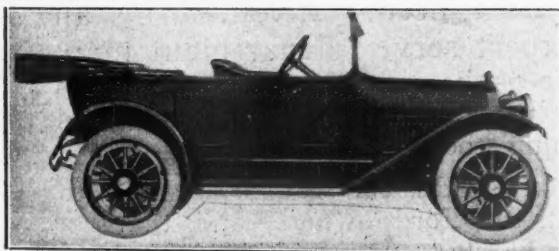
Dealers: We have a proposition of interest to you. We will sell you public garage outfit, at the same time give you agency for the complete Tokheim line. Choice territory still open.

Auto Owners: Write us for prices and catalogs.

Tokheim Mfg. Co.,

Main Office and Factory
815-19 N. First St., West,
Cedar Rapids, Iowa

EXTRA \$1500 BRAND NEW 1915 Touring Cars and Roadsters THE GREATEST BARGAIN EVER OFFERED IN A HIGH-GRADE AUTOMOBILE **at \$875**



This
is
the
car

If we could advertise the manufacturer's name we could demand a much higher price. The name plate of the manufacturer appears on the radiator.

Catalog and Name Given on Request

This car has never before been sold for less than list price. It is a well-known make. Thousands of these cars are now in use.

ELECTRIC STARTER AND LIGHTS

Motor 4-cylinder, 4½-inch bore by 6¼ stroke, three-point suspension with unit power plant, ignition, magneto, dual system, Stromberg carburetor, transmission 3 speeds, centre control, right and left drive, full floating rear, 34x4 tires, demountable rims, Goodyear-no-rim-cut tires, 114-inch wheelbase.

EQUIPMENT

In addition to Electric Starter and Lights, each car is equipped with Silk Mohair Top, with curtains and dust cover. Electric Horn, Lock Switch. Robe Rail. Foot Rail. Rain Vision, 2-piece windshield. Tire Repair Outfit. Demountable Rims, with extra rim. Speedometer. Tool Outfit. Combined single and double Tire Holders. Electric Light Dimmer. Speedometer Light, nickel finish.

These cars were ordered for export, but owing to demoralized transportation facilities could not be shipped abroad, making it possible for us to buy the entire order for Spot Cash.

We have only a limited number so act quick, cars now on our sales floors.

The manufacturers of these cars are in a healthy financial condition and can furnish parts at any time. Every car sold with a guarantee.

We will ship you this car on receipt of deposit to cover freight charges, with privilege of inspection.

CORSON'S AUTOMOBILE EXCHANGE

238-240 N. Broad Street, Philadelphia, Pa.

Agents Wanted

Write for Catalogue



STEER WARM'S

Insure Warm

Hands and Comfort

on the Coldest of Winter Days

STEER WARM'S consist of two electrically heated, leather covered grips that lace on the steering wheel. They keep your fingers and hands from becoming chilled on the rawest day—and that means you are warm all over.

They take only a minute to attach. Lace on; wire up. That's all. No marring the wheel. No holes to bore. A switch conveniently located regulates the heat. The current is taken from the battery, electric lighting system or magneto. Very little current required. Steer Warms guaranteed to give satisfaction and not to burn out within five years.

PRICE: \$7.50 per pair complete, ready to attach to any car. Special STEER WARM'S for Ford cars, \$5.00.

The IECO Electric Manifold Plug combines three separate devices into one. First, it is a primer and from the dash you can prime your car without raising the hood. Second, it is an electric vaporizer, which enables you to start your car almost instantly on the coldest winter day. Third, it is a gasoline saver when used as an auxiliary air valve, saving at least 20% to 30% of your gasoline expense.

Material and workmanship are fully guaranteed. Booklet upon request.

DEALERS: Car owners everywhere want STEER WARM'S and MANIFOLD PLUGS. Get your share of this business. We back you up with our positive guarantee. Write for our discounts.

INTERSTATE ELECTRIC COMPANY
362 Baronne St., New Orleans, La.

For Leaky Cylinders

Superior to All Others



PATENTED AUGUST 6, 1912

A Piston Ring Which Gives Compression in "Out-of-Round" Cylinders as Perfectly as in True Ones



Here is a piston ring that gives 100% efficiency to every type of motor, engine, compressor or pump.

Ideally adapted to use in Automobile and Motorboat engines. Gives compression when all others fail. No need to rebore worn cylinders—simply install EVER-TIGHT piston rings and the motor is good as new.

EVER-TIGHT piston rings are made up of three individual, interlocking rings, grooved together to give flexibility and reduce friction. This three-part construction is clearly seen in illustrations above. This is the only three-piece piston ring on the market.

If dealers do not carry EVER-TIGHT piston rings, Auto repair men should write us.

Jobbers and dealers wanted everywhere. Write for particulars.

THE EVER-TIGHT PISTON RING CO.

1416 CHESTNUT STREET

ST. LOUIS, MO.

The Best
Special Body
Value of
the Year

Complete
With All
Modern
Refinements
of Style
and Comfort



This Is Another Popular
Closed-Body Style in the

**ROBBINSFORD
LINE**

The beauty and service of the justly popular ROBBINSFORD Coupe illustrated above does not appeal to the Ford owner merely because it transforms the Standard Ford Roadster into an elegantly designed, luxuriously appointed closed car—but because it increases the value and comfort of such a Roadster many times over the actual cost of the improvement. Equipment and appointments, equal to those usually formed in cars of this type costing three times more, include double adjusting windshield; sashless windows of fine plate glass with patented, interlocking lifting device; electric dome lights, complete with wiring; elegant upholstered seats for three passengers. The floor is carpeted, fittings the highest grade, and, best of all, the entire body can be quickly fitted to any Standard Ford Roadster at trifling expense.

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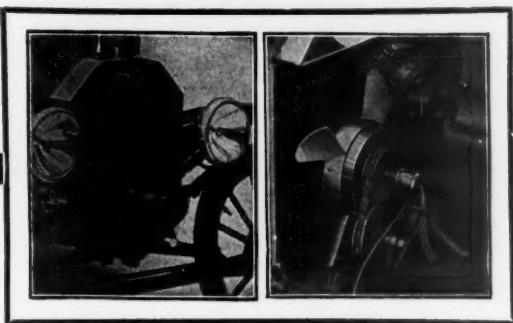
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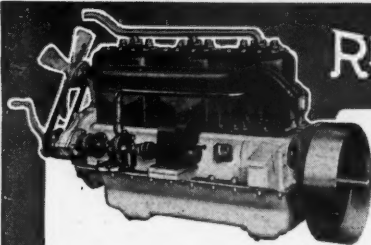
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112 inch wheel base. Electrically started and lighted.

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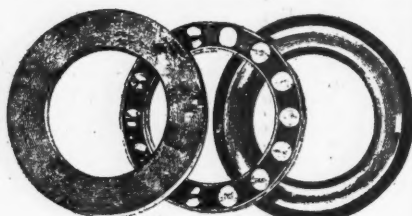
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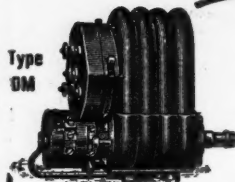
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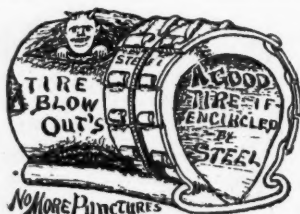


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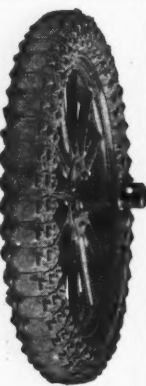
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Including Electric Starting and Lighting System

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"The wheel that makes any car modern"

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Send for dealers' discount on these "jolt eliminators"

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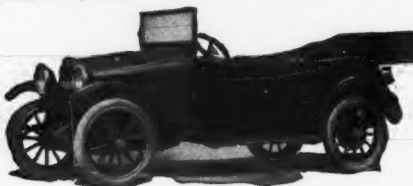
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FIRST Pure European Streamline in This Country



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Full Floating Rear Axle, Platform Rear Spring Suspension, All Recording Instruments in One Unit, Red Electric Flash Oil Gauge, Carburetor Above Frame, 112 Inch Wheel Base, Left Hand Drive, Center One-Lever Control, Multiple Disc Clutch in Oil, Less than 2300 Pounds, 32 H.P.

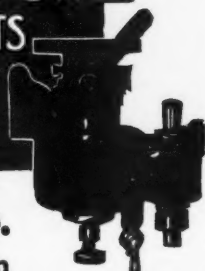
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"K. No. 00 Special" grade for sliding gear transmission
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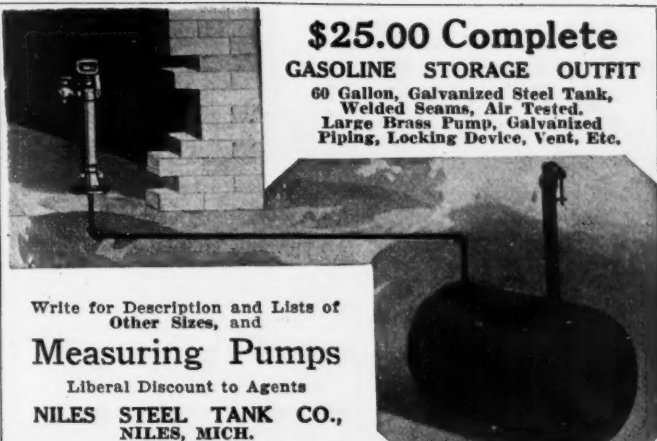
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but your engine will start as quickly as in Summer and the cylinders will fire as regularly if equipped with




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1915 PRIMING PLUGS
Masters the motor at any temperature
All Sizes \$1.25 Porcelain or Mica

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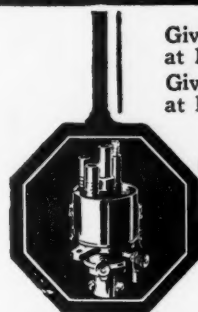
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Gives its hottest spark for starting and at low speeds.
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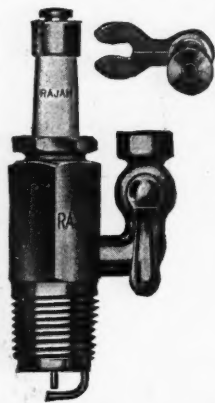
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Complete System **\$50.00**



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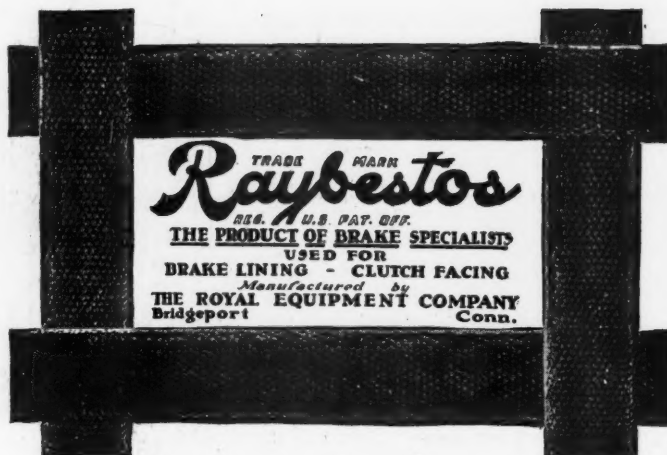
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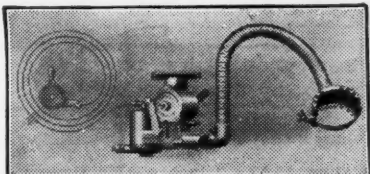
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Phenomenal Results
More Lugging Power
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The men who sell the MASTER sell results.

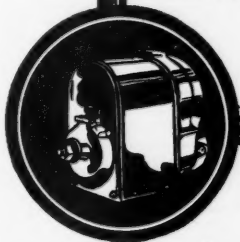
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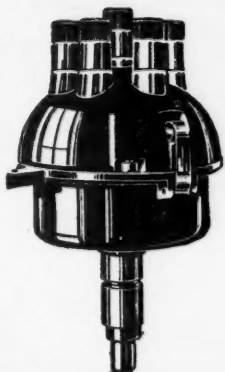
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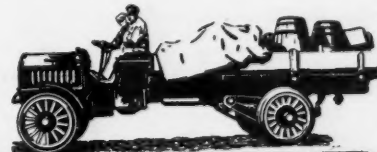


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Special built speedsters; speed very fast, price \$1,500; also will consider your old car as part payment. Write for full information to
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Winton Six, 1914 Model

Run 6,000 miles. Fully equipped. Will guarantee first class condition. \$1,750 or make cash offer. No trade considered.

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seven passenger touring car that is in absolutely A-1 shape in every respect. Has been driven 10,148 miles—just enough to work it in nicely—and runs like a sewing machine. Top and curtains like new, seat covers and paint good, tires 37x5 non-skid all in good shape. Other equipment includes Banker windshield, Warner speedometer, Klaxon horn, Vesta electric generator lighting system, Thurber air starter and Q. D. demountable rims, one spare. This car will bear the most rigid inspection. It is a real snap and will be sold to the first buyer for \$1200 cash—no trades. Phone, wire or write

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\$50 Each

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Special ratio differential ring gear and drive pin for the Ford. Either 2 4/7-1 or 3-1 ratio.

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The Clearing House—continued.

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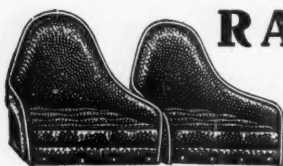
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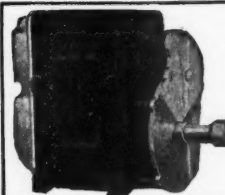
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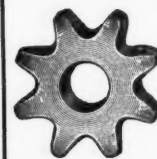
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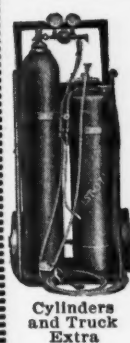
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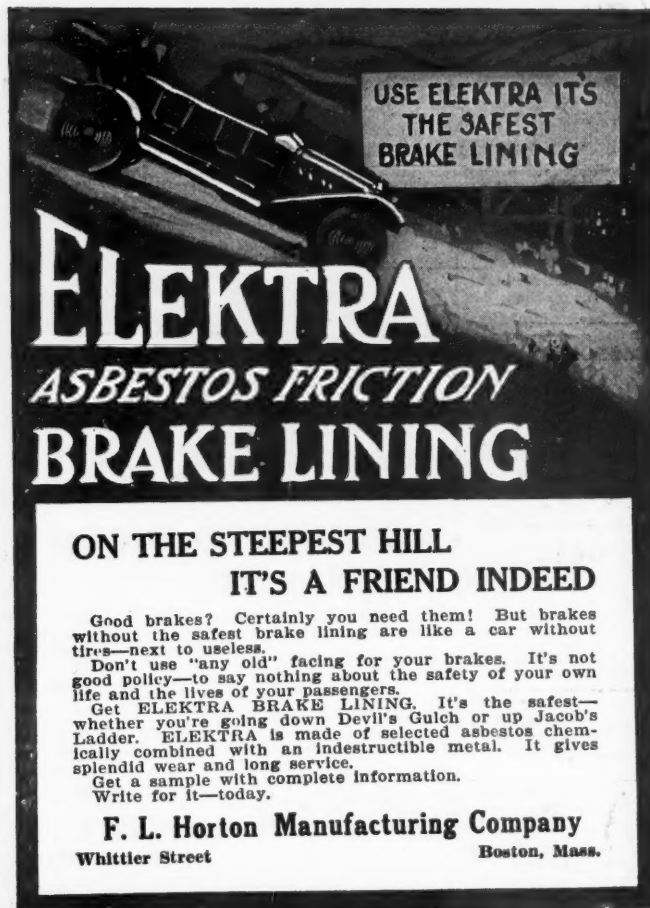
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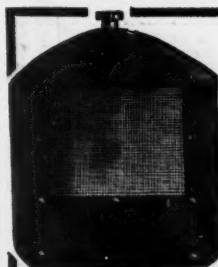
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The Allen Radiator Cover

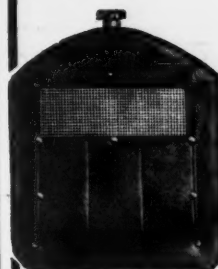
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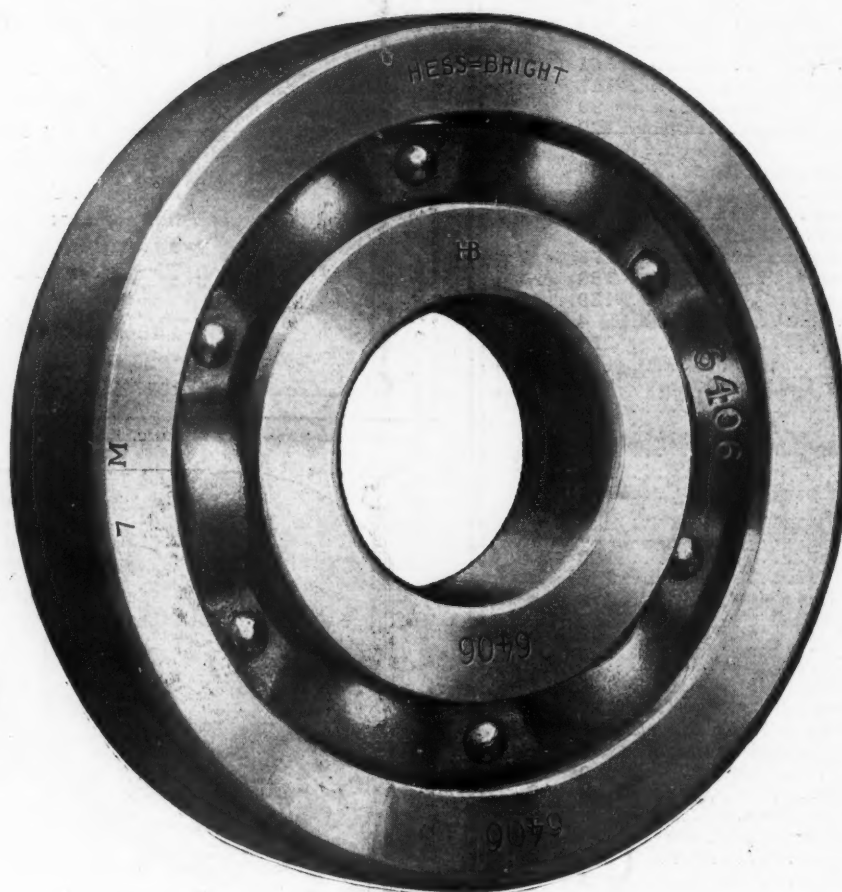
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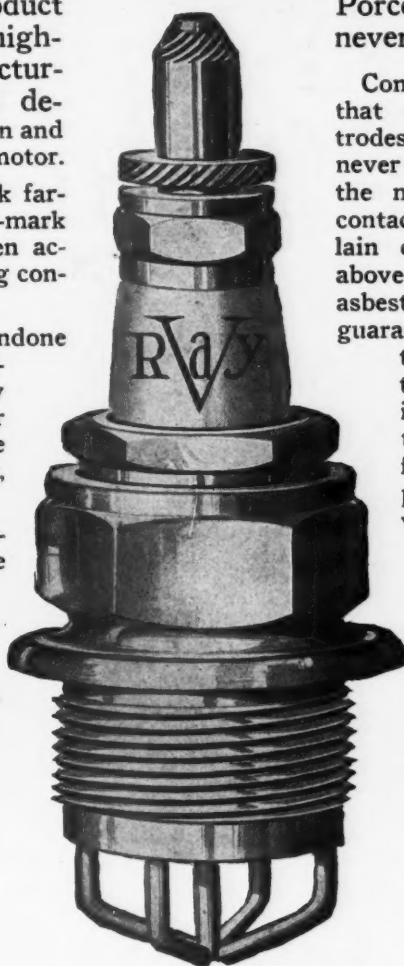
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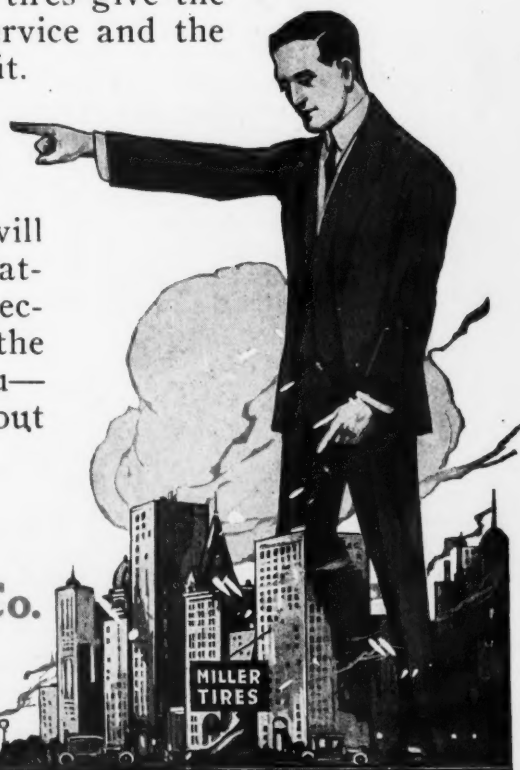
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